Department of Dentistry

Third Class

Microbiology

Lec: 1

Medical Microbiology

Introduction

Microbiology is the study of living organisms of micro- scopic size. **Medical microbiology** is the subdivision concerned with the causative agents of infectious disease of man, the response of the host to infection and various methods of diagnosis, treatment and prevention.

- Knowledge of the existence of life invisible to the naked eye first emerged in the 17th century, with the invention of the microscope by Dutch microscopist Antonie van Leeuwenhoek.
- Among the various types of "animalcules," or little animals, that Leeuwenhoek discovered with the aid of his microscope were the single-celled organisms now known as bacteria.
- Microbes are single celled organisms
- Too small to be seen with the naked eye
- Despite their minute size, this organisms form the basis for all life on earth.
- Microbiology is the study of microscopic organisms, such as bacteria, viruses, archaea, fungi and protozoa.

Modern medical microbiology

- **Bacteriology** – the science of bacteria, the causative agents of a member of infectious diseases.
- **Virology** – the science of viruses, non-cellular living systems, capable of causing infectious diseases in man.
- **Immunology** – the science which concerned with mechanisms of body protection against pathogenic microorganisms and foreign cells and substances.
- **Mycology** – the study of fungi pathogenic for man.

- **Protozoology** – which deals with pathogenic unicellular animal organisms.

Cell:

There are two different types of cells of living organisms:

prokaryotic cells and **eukaryotic** cells based on differences in cellular organization and biochemistry.

- **Prokaryotic cells** (cells lacking a nucleus)- bacteria and archaea
- **Eukaryotic cells** (cells with a nucleus)- protozoa, algae and fungi.

Bacteria

- Bacteria are unicellular organisms. Because they have no nucleus, the cells are describes as prokaryotic.
- The three major basic shapes of bacteria are bacillus, coccus and spiral. It also vary in size.
- Most bacteria have a peptidoglycan cell wall; they divide by binary fission; and they may possess flagella
- Bacteria can use a wide range of chemical substances for their nutrition

The Size of Bacteria

- Bacteria are generally smaller than the cells of eukaryotes, but larger than viruses. Bacteria are measured in units of length called micrometers, or microns.
- **Most bacteria range from 1 to 5 microns in size**. The light microscope can magnify an image approximately 1,000 times, and is used for basic studies of bacteria.

Microbes in our lives

- Microorganism is important in the maintenance of an ecological balance on earth.

- Some microorganisms live in humans and other animals and are needed to maintain the animal's health.
- Some microorganisms are used to produce foods and chemicals.
- Some microorganism cause disease

Shape and Arrangement of bacteria

- ❖ Cocci(s.,coccus)–spheres
- ❖ diplococci (s., diplococcus) – pairs
- ❖ streptococci – chains
- ❖ staphylococci – grape-like clusters
- ❖ tetrads – 4 cocci in a square
- ❖ sarcinae – cubic configuration of 8 cocci