

**Lecture 14 : Enterobacteriaceae**

The Enterobacteriaceae are a large family of Gram-negative bacteria that includes, along with many harmless symbionts, many of the more familiar pathogens, such as *Salmonella*, *Escherichia coli*, *Yersinia pestis*, *Klebsiella*, and *Shigella*. Other disease-causing bacteria in this family include *Proteus*, *Enterobacter*, *Serratia*, and *Citrobacter*.

***Escherichia coli*** :also known as *E. coli* is a Gram-negative, facultatively anaerobic, rod-shaped, motile coliform bacterium of the genus *Escherichia* that is commonly found in the lower intestine of warm-blooded organisms (UTI, meningitis, gastroenteritis). Most *E. coli* strains are harmless, but some serotypes can cause serious food poisoning in their hosts. The harmless strains are part of the normal flora of the gut, and can benefit their hosts by producing vitamin K<sub>2</sub>, and preventing colonization of the intestine with pathogenic bacteria, having a symbiotic relationship, coli is expelled into the environment within fecal matter , the virulence factors of recognized importance in the pathogenesis of urinary tract infection (UTI) include adhesins by pili of bacteria *E.coli*

Phylum: Proteobacteria

Class: Gammaproteobacteria

Order: Enterobacteriales

Family: Enterobacteriaceae

Genus: *Escherichia*

Species: *E. coli*

**Culture growth**

Optimum growth of *E. coli* occurs at 37 °C , but some laboratory strains can multiply at temperatures up to 49 °C, *E. coli* is classified as a facultative anaerobe. It uses oxygen when it is

present and available. It can, however, continue to grow in the absence of oxygen using fermentation or anaerobic respiration. The ability to continue growing in the absence of oxygen is an advantage to bacteria because their survival is increased in environments where water predominates.

*Klebsiella* is a genus of nonmotile, Gram-negative, oxidase-negative, rod-shaped bacteria with a prominent polysaccharide-based capsule. *Klebsiella* species are found everywhere in nature. They can be found in water, soil, plants, insects, animals, and humans. *Klebsiella* spp. have large capsule (form large and very mucoid colonies);

*Klebsiella* is named after German-Swiss microbiologist Edwin Klebs (1834–1913). Carl Friedlander described *Klebsiella* bacillus which is why it was termed Friedlander bacillus for many years. The members of the genus *Klebsiella* are a part of the human and animal's normal flora in the nose, mouth and intestines. The species of *Klebsiella* are all gram-negative and non-motile. They tend to be shorter and thicker when compared to others in the Enterobacteriaceae family. The cells are rods in shape and generally measures 0.3 to 1.5  $\mu\text{m}$  wide by 0.5 to 5.0  $\mu\text{m}$  long. They can be found singly, in pairs, in chains or linked end to end. *Klebsiella* can grow on ordinary lab medium and do not have special growth requirements, like the other members of Enterobacteriaceae. The species are aerobic but facultatively anaerobic. Their ideal growth temperature is 35° to 37°, while their ideal pH level is about 7.2

*Klebsiella* species are routinely found in the human nose, mouth, and gastrointestinal tract as normal flora; however, they can also behave as opportunistic human pathogens. *Klebsiella* species are known to also infect a variety of other animals, both as normal flora and opportunistic pathogens.

*Klebsiella* organisms can lead to a wide range of disease states, notably pneumonia, urinary tract infections, septicemia, meningitis, diarrhea, and soft tissue infections. The majority of human *Klebsiella* infections are caused by *K. pneumoniae*.

**Treatment** : meropenem