E. coli Overview

Escherichia coli, commonly abbreviated E. coli, is a gram-negative bacilli often found as normal flora in the intestines. These bacteria can be differentiated from other gram-negative rods by a distinctive purple colony with metallic green sheen when grown on EMB agar. It is also lactose-fermenting, causing growth of pink colonies on MacConkey agar. Most E. coli strains are harmless, but pathogenic strains can cause disease. Pathogenic strains are categorized based on elements that cause an immune response and include Lipid A, K antigen, and H antigen. Lipid A is a hydrophobic fatty acid chain that anchors the lipopolysaccharides (LPS) into the bacterial membrane, and it is responsible for causing septic shock when the bacterial cells are lysed and the fragments are released into the circulation. Pathogenic strains of K antigen can cause neonatal meningitis and pneumonia when infants acquire the organism during passage through the birth canal. H antigen refers to flagella, which allows E. coli to be motile. Some pathogenic strains also contain P pili, an adhesion that binds to a specific galactose disaccharide found on surfaces of uroepithelial cells. Strains with P pili are strongly associated with urinary tract infections. E. coli is also a common cause of food poisoning and can cause diarrhea.



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Characteristics

Gram-Negative
Graham-cracker Negative-devil
This organism stains gram-negative due to relatively thin peptidoglycan layer in the cell wall.

Bacillus
Rod
This organism is rod shaped.

Purple Colony with Metallic Green Sheen
Purple and Green yin-yang with Metallic Sheen
Eosin Methylene Blue is a selective stain used for differentiation of gram-negative bacteria. On EMB, E. coli colonies give a distinctive green sheen to help with identification.

Lactose-Fermenting
Milk-carton Ferns
This organism can be differentiated from other gram-negative bacilli because it is lactose-fermenting, causing growth of red pink colonies on MacConkey agar.

Pink on MacConkey Agar
Pink Monkey Petri-dish
This organism can be differentiated from other gram-negative bacilli because it is lactose-fermenting, causing growth of red pink colonies on MacConkey agar.

Disease

Diarrhea
Toilet
E. coli is a common cause of food poisoning and can cause diarrhea.

Lipid A Septic Shock
Lips A-Apple with the Shocking Sepsis-snake
Lipopolysaccharides (LPS) are found in the outer membrane of many gram-negative bacteria and act as endotoxins that can cause a strong immune response. LPS has three components; Lipid A, core, and O antigen. Lipid A is a hydrophobic fatty acid chain that anchors the LPS into the bacterial membrane, and it is responsible for causing septic shock when the bacterial cells are lysed and the fragments are released into the circulation.

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P Pili Pyelonephritis and Cystitis

Pillars with Inflamed Kidney and Bladder

Some pathogenic strains contain P pili, an adhesion that binds to a specific galactose disaccharide found on surfaces of uroepithelial cells. Strains with P pili are strongly associated with urinary tract infections with inflammation of the bladder and can also lead to pyelonephritis.

K Capsule Neonatal Meningitis

Men-in-tights with babies wearing K-caps

The K antigen refers to a polysaccharide capsule that surrounds some pathogenic strains of E coli. Pathogenic strains of K antigen can cause neonatal meningitis and pneumonia when infants acquire the organism during passage through the birth canal.

K Capsule Pneumonia

Nude-Mona wearing K-cap

The K antigen refers to a polysaccharide capsule that surrounds some pathogenic strains of E coli. Pathogenic strains of K antigen can cause neonatal meningitis and pneumonia when infants acquire the organism during passage through the birth canal.

H Antigen Flagella

H Ant-gem with Flagella

H antigen refers to flagella, which allows E. coli to be motile.

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