# Pathogenic bacteria and clinical significance

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Pathogenic bacteria are bacteria that can cause disease. This article deals with human pathogenic bacteria. Although most bacteria are harmless or often beneficial, some are pathogenic, with the number of species estimated as fewer than a hundred that are seen to cause infectious diseases in humans. By contrast, several thousand species exist in the human digestive system. One of the bacterial diseases with the highest disease burden is tuberculosis, caused by Mycobacterium tuberculosis bacteria, which kills about 2 million people a year, mostly in sub-Saharan Africa. Pathogenic bacteria contribute to other globally important diseases, such as pneumonia, which can be caused by bacteria such as Streptococcus and Pseudomonas, and foodborne illnesses, which can be caused by bacteria such as Shigella, Campylobacter, and Salmonella. Pathogenic bacteria also cause infections such as tetanus, typhoid fever, diphtheria, syphilis, and leprosy. Pathogenic bacteria are also the cause of high infant mortality rates in developing countries Koch's postulates are the standard to establish a causative relationship between a microbe and a disease. Each species has specific effect and causes symptoms in people who are infected. Some, if not most people who are infected with a pathogenic bacteria do not have symptoms. Immunocompromised individuals are more susceptible to pathogenic bacteria. Pathogenic susceptibility: Some pathogenic bacteria cause disease under certain conditions, such as entry through the skin via a cut, through sexual activity or through a compromised immune function. An abscess caused by opportunistic S. aureus bacteria. Streptococcus and Staphylococcus are part of the normal skin microbiota and typically reside on healthy skin or in the nasopharangeal region. Yet these species can potentially initiate skin infections. They are also able to cause sepsis, pneumonia or meningitis. These infections can become quite serious creating a systemic inflammatory response resulting in massive vasodilation, shock, and death. Other bacteria are opportunistic pathogens and cause disease mainly in people suffering from immunosuppression or cystic fibrosis. Examples of these opportunistic pathogens include Pseudomonas aeruginosa, Burkholderia cenocepacia, and Mycobacterium avium. Intracellular: Obligate intracellular parasites (e.g. Chlamydophila, Ehrlichia, Rickettsia) have the ability to only grow and replicate inside other cells. Even these intracellular infections may be asymptomatic, requiring an incubation period. An example of this is Rickettsia which causes typhus. Another causes Rocky Mountain spotted fever. Chlamydia is a phylum of intracellular parasites. These pathogens can cause pneumonia or urinary tract infection and may be involved in coronary heart disease. Other groups of intracellular bacterial pathogens include Salmonella, Neisseria, Brucella, Mycobacterium, Nocardia, Listeria, Francisella, Legionella, and Yersinia pestis. These can exist intracellularly, but can exist outside of host cells. The symptoms of disease appear as pathogenic bacteria damage host tissues or interfere with their function. The bacteria can damage host cells directly. They can also cause damage indirectly by provoking an immune response that inadvertently damages host cells. Once pathogens attach to host cells, they can cause direct damage as the pathogens use the host cell for nutrients and produce waste products. For example, Streptococcus mutans, a component of dental plaque, metabolizes dietary sugar and produces acid as a waste product. The acid decalcifies the tooth surface to cause dental caries. However, toxins produced by bacteria cause most of the direct damage to host cells Endotoxins are the lipid portions of lipopolysaccharides that are part of the outer membrane of the cell wall of gram-negative bacteria. Endotoxins are released when the bacteria lyses, which is why after antibiotic treatment, symptoms can worsen at first as the bacteria are killed and they release their endotoxins. Exotoxins are secreted into the surrounding medium or released when the bacteria die and the cell wall breaks apart.