Lecturer 18: *Vibrio*

Vibrio: is a genus of Gram-negative bacteria, possessing a curved-rod shape (comma shape), several species of which can cause foodborne infection, usually associated with eating undercooked seafood. Typically found in salt water, *Vibrio* species are facultative anaerobes that test positive for oxidase and do not form spores. All members of the genus are motile and have polar flagella with sheaths. *V. cholerae* is a facultative anaerobe, and can undergo respiratory and fermentative metabolism

The bacteria natural habitat is a saltwater. Some strains of *V. cholerae* cause the disease cholera. *V. cholerae* is a facultative anaerobe and has a flagellum at one cell pole as well as pili. *V. cholerae* can undergo respiratory and fermentative metabolism. When ingested, *V. cholerae* can cause diarrhea and vomiting in a host within several hours to 2–3 days of ingestion. *V. cholerae* was first isolated as the cause of cholera by Italian anatomist Filippo Pacini in 1854, but his discovery was not widely known until Robert Koch, working independently 30 years later, publicized the knowledge and the means of fighting the disease.

Kingdom:	Bacteria
Phylum:	Proteobacteria
Class:	Gammaproteobacteria
Order:	Vibrionales
Family:	Vibrionaceae
Genus:	***Vibrio***

Pathogenic strains

Several species of *Vibrio* are pathogens. Most disease-causing strains are associated with gastroenteritis, but can also infect open wounds and cause septicemia. They can be carried by numerous marine animals, such as crabs or prawns, Pathogenic *Vibrio* species can cause

foodborne illness (infection), usually associated with eating undercooked seafood. Many *Vibrio* species are also zoonotic. They cause disease in fish and shellfish, and are common causes of mortality among domestic marine life.

Flagella

The "typical", early-discovered *Vibrio* species, such as *V. cholerae*, have a single polar flagellum (monotrichous) with sheath. Some species, , have both a single polar flagellum with sheath and thin flagella projecting in all directions (peritrichous), and the other species, have tufts of polar flagella with sheath (lophotrichous).

Treatment

Medical care depends on the clinical presentation and the presence of underlying medical conditions.Although most *Vibrio* species are sensitive to antibiotics such as doxycycline or quinolones, antibiotic therapy does not shorten the course of the illness or the duration of pathogen excretion. However, if the patient is ill and has a high fever or an underlying medical condition, oral antibiotic therapy with doxycycline or a quinolone can be initiated.

Campylobacter jejuni :is one of the most common causes of food poisoning . The vast majority of cases occur as isolated events, not as part of recognized outbreaks. Active surveillance through the Foodborne Diseases Active Surveillance *Campylobacter jejuni* is in a genus of bacteria that is among the most common causes of bacterial infections in humans worldwide. Campylobacter means "curved rod", deriving from the Greek *campylos* (curved) and *baktron*(rod). It has been noted that there "is wide diversity in the genus. The species are metabolically and genetically different to the extent that one can question whether one genus is adequate to house all of the species." of its many species, *C. jejuni* is considered one of the most important from both a microbiological and public health perspective.

C. jejuni is also commonly found in animal feces. *Campylobacter* is a helical-shaped, nonspore-forming, Gram-negative, microaerophilic, nonfermenting bacterium forming motile rods with a single polar flagellum, which are also oxidase-positive and grow optimally at 37 to 42 °C. When exposed to atmospheric oxygen, *C. jejuni* is able to change into a coccal form. This species

of pathogenic bacteria is one of the most common causes of human gastroenteritis in the world. Food poisoning caused by *Campylobacter* species can be severely debilitating, but is rarely life-threatening. It has been linked with subsequent development of Guillain–Barré syndrome, which usually develops two to three weeks after the initial illness. Individuals with recent *C. jejuni* infections develop Guillain-Barré syndrome at a rate of 0.3 per 1000 infections, about 100 times more often than the general population.

Disease

Campylobacteriosis is an infectious disease caused by bacteria of the genus *Campylobacter*. In most people who become ill with campylobacteriosis, symptoms develop within two to five days of exposure to the organism and illness typically lasts seven days following onset. Infection with *C. jejuni* usually results in enteritis, which is characterised by abdominal pain, diarrhea, fever, and malaise. Diarrhea itself can vary in severity from loose to bloody stools. The disease is usually self-limiting. However, it does respond to antibiotics. Severe (accompanying fevers, blood in stools) or prolonged cases may require erythromycin, azithromycin, ciprofloxacin, or norfloxacin. Fluid replacement via Oral Rehydration Salts may be needed and intravenous fluid may be required for serious cases.

Pathogenesis

Studies on the pathogenesis of *C. jejuni* show that for this organism to cause disease, the susceptibility of the host and the relative virulence of the infecting strain are both important. Infection results from the ingestion of contaminated food or water, and the infective dose can be as low as 800 organisms. To initiate infection, the organism must penetrate the gastrointestinal mucus, which it does using its high motility and spiral shape. The bacteria must then adhere to the gut enterocytes and can then induce diarrhea by toxin release. *C. jejuni* releases several different toxins, mainly enterotoxin and cytotoxins, which vary from strain to strain and correlate with the severity of the enteritis The bacteria colonize the small and large intestines, causing inflammatory diarrhea with fever. Stools contain leukocytes and blood.

Treatment

Patients with *Campylobacter* infection should drink plenty of fluids as long as the diarrhea lasts to maintain hydration. One must drink plenty of fluids and get rest. If he or she cannot drink enough fluids to prevent dehydration or if the symptoms are severe, medical help is indicated. In more severe cases, certain antibiotics can be used and can shorten the duration of symptoms if given early in the illness, not antibiotic treatment, is the cornerstone of treatment for *Campylobacter* enteritis. Indeed, most patients with this infection have a self-limited illness and do not require antibiotics at all. Nevertheless, antibiotics should be used in specific clinical circumstances. These include high fevers, bloody stools, prolonged illness

Prevention

Some simple food-handling practices can help prevent *Campylobacter* infections.

- Cook all poultry products thoroughly. Make sure that the meat is cooked throughout (no longer pink) and any juices run clear. All poultry should be cooked to reach a minimum internal temperature of 165 °F (74 °C).
- Wash hands with soap before preparing food.
- Wash hands with soap after handling raw foods of animal origin and before touching anything else.
- Prevent cross-contamination in the kitchen by using separate cutting boards for foods of animal origin and other foods and by thoroughly cleaning all cutting boards, countertops, and utensils with soap and hot water after preparing raw food of animal origin.
- Do not drink unpasteurized milk or untreated surface water.
- Make sure that people with diarrhea, especially children, wash their hands carefully and frequently with soap to reduce the risk of spreading the infection.
- Wash hands with soap after contact with pet feces.