

Anbar University

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Vibrio

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Textbook of Diagnostic Microbiology (Mahon, Textbook of Diagnostic Microbiology), Connie R. Mahon MS, Donald C. Lehman EdD
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Jawetz Melnick & Adelbergs Medical Microbiology, Stefan Riedel (Author), Stephen Morse (Author), Timothy Mietzner (Author), Steve Miller.

Mims' Medical Microbiology and Immunology, International Edition, Goering.

***Vibrios* :**

V. cholerae is a genus of Gram-negative bacteria, possessing a 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. All members of the genus are motile. They are able to have polar or lateral flagellum with or without sheaths.

Antigenic structure :

- ◆ Heat – labile flagellar H antigen
- ◆ O LPS that confer serologic specificity. There are at least 139 O antigen groups.

***Vibrio cholerae* Enterotoxin (cholera toxin)**

V. cholerae produce a heat-labile enterotoxin with a molecular weight (MW) of about 84,000, consisting of subunits A (MW, 28,000) and B. Ganglioside 1 serves as the mucosal receptor for subunit B, which promotes entry of subunit A into the cell. Activation of subunit A1 yields increased levels of intracellular cyclic adenosine monophosphate (cAMP) and results in prolonged hypersecretion of water and electrolytes. There is increased sodium-dependent chloride secretion, and absorption of sodium and chloride by the microvilli is inhibited. Electrolyte-rich diarrhea occurs— as much as 20–30 L/day—with resulting dehydration, shock, acidosis, and death.

Pathology

It is pathogenic only for humans. Any medication or condition that decreases stomach acidity makes a person more susceptible to infection with *V. cholerae*. Cholera is not an invasive infection, the organism does not reach the blood stream but remain within the intestinal tract.

The *V. cholerae* attach to the microvilli of the brush border of epithelial cells. There they multiply & liberate cholera toxin & perhaps mucinases & endotoxin.

Important Properties

V. cholera is divided into two groups according to the nature of its O cell wall antigen. Members of the O1 group cause epidemic disease, whereas non-O1 organisms either cause sporadic disease or are nonpathogens. The O1 organisms have two biotypes, called classic and El Tor, and three serotypes, called Ogawa, Inaba, and Hikojima. (Biotypes are based on differences in biochemical reactions, whereas serotypes are based on antigenic differences.) These features are used to characterize isolates in epidemiologic investigations.

Clinical Findings

Watery diarrhea in large volumes is the hallmark of cholera. There are noted blood cells or white blood cells in the stool. Rice-water stool is the term often applied to the non-bloody effluent. There is no abdominal pain, and subsequent symptoms are preferable to the marked dehydration. The loss of fluid and electrolytes leads to cardiac and renal failure. Acidosis and hypokalemia also occur as a result of loss of bicarbonate and potassium in the stool. The mortality rate without treatment is 40%.

Treatment

Treatment consists of prompt, adequate replacement of water and electrolytes, either orally or intravenously. Glucose is added to the solution to enhance the uptake of water and electrolytes. Antibiotics such as tetracycline are not necessary, but they do shorten the duration of symptoms and reduce the time of excretion of the organisms.

Prevention

Prevention is achieved mainly by public health measures that ensure a clean water and food supply. The vaccine, composed of killed organisms, has limited usefulness; it is only 50% effective in preventing disease for 3 to 6 months and does not interrupt transmission. The use of tetracycline for prevention is effective in close contacts but cannot prevent the spread of a major epidemic. Prompt detection of carriers is important in limiting outbreaks.

3. *Vibrio vulnificus*

V. vulnificus is also a marine organism. It causes severe skin and soft tissue infections (cellulitis), especially in shellfish handlers, who often sustain skin wounds. It can also cause a rapidly fatal septicemia in immunocompromised people who have eaten raw shellfish containing the organism. Hemorrhagic bullae in the skin often occur in patients with sepsis caused by *V. vulnificus*. Chronic liver disease (e.g., cirrhosis) predisposes to severe infections. The recommended treatment is doxycycline.