

VIBRIO

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These organisms were at one time classified together in the family **Vibrionaceae** and were separated from the Enterobacteriaceae on the basis of a positive **oxidase** reaction and the presence of polar flagella.

The second major group of gram-negative, facultatively anaerobic, fermentative rods are the genera ***Vibrio*** and ***Aeromonas***.

They are curved aerobic rods and are motile possessing a polar flagellum . *V. cholera* serogroups O1 and O139 cause cholera in humans ,while other vibrios cause sepsis or enteritis .

Morphology:

Upon first isolation *V. Cholera* is a comma shaped, curved rod 2-4 micrometers long , it is actively motile by of a polar flagellum , on prolonged cultivation, vibrios may become straight rods that resembles enteric bacteria.

CULTURE:

V. cholera grow well at 37C on many types of media, including media that contains mineral salts and asparagine as a source of carbon and nitrogen.

V. cholera grows well on Thiosulfate citrate bile sucrose (TCBS) agar on which it produce yellow colonies while other non cholera organisms produce green colonies .

Vibrios are oxidase positive bacteria . Vibrio grow at PH 8.5-9,5 and are rapidly killed by acid.

Cultures containing fermentable carbohydrates therefore quickly become sterile.

Biochemical reactions :

***V. cholera* regularly ferments sucrose and mannose but not arabinose. Most of Vibrio species are halotolerant and NaCl often stimulates their growth so Vibrio grow on media containing 6% NaCl while Aeromonas does not grow .**

Antigenic structure :

The somatic antigen O Ag is of fundamental importance in the identification of this organism. There are 140 serotypes of V. cholera O serogroups , the causative organism of epidemic cholera is defined by possessing O1 Ag and it is known as V. cholera O1 . serotype O 139 is included within this group .

Other strains of serogroups are known as non –O1 V. cholera and correspond to non agglutinable vibrios (NAG) or Non Cholera Vibrios (NCV). It share V. cholera H Ag. O1 strains can be divided on the bases of O Ags. into subtypes Inaba , Ogawa and Hikojima.

Vibrio cholera O1 also can be divided into Classical and Eltor biotypes. The Eltor biotype can be distinguished from the classical biotype by the following tests:

Classical biotype

- **Sensitive to Polymyxin**
- **Hemolysis is negative**
- **Phage sensitive**
- **Negative Agglutination of sheep RBCs**
- **VP test is negative**

Eltor biotype

Resistant
positive
phage resistant
positive
positive

Pathogenesis :

The sequence of events leading to cholera are confined to the gut . cholera vibrios are ingested in drink and food , the infective dose is about 10^3 - 10^8 depending on the nature of source of the infection (fluid or solid). After passing the acid barrier of the stomach the organism begin to multiply in the alkaline environment of small intestine, where they multiply and produce a potent toxin enterotoxin known as Cholera toxin . it is AB toxin . part A consists of two subunits connected by S-S bond. The B subunit binds to sugar residues of a specific ganglioside receptor on the cell lining the villi and crypts of the small intestine. The hydrophilic transmembrane channels through which toxic A subunit pass into the cytoplasm.

Pathogenesis :

Part A activates *Adenylate cyclase* and overproduction of Cyclic AMP. This causes inhibition of Na^+ and Cl^- uptake by cells lining villi together with hypersecretion of Cl^- and HCO_3^- ions . this blocks the uptake of water .

There is a passive net outflow of water across mucosal cells leading to serious loss of water and electrolytes . Cholera toxin is related to *E. coli* heat labile toxin . *Vibrio cholera* do not invade blood stream .

Virulence factors :

Motility of organism , cholera toxin , mucinase production and adhesive hemagglutinins.

CLINICAL FINDINGS :

About of 60 % of infections with classic V. cholera asymptomatic , as are about 70 % of infections with El Tor biotype .

The incubation period is 1-4 days for persons who develop symptoms .

There is sudden onset of nausea , vomiting and profuse diarrhea with abdominal cramps .

Stool which resembles rice water contain epithelial cells , mucous and large number of vibrios . There is rapid loss of fluid , electrolytes which leads to profound dehydration , circulatory collapse and anuria. El Tor biotype tends to cause milder disease than Classic biotype.

Treatment :

**The most important part of therapy consists of water and electrolyte Replacement to correct the severe dehydration and salt depletion .
Oral tetracycline therapy is effective .**

Prevention :

Vaccination of intact people

Aeromonas:

It is related bacterial type to Vibrio , it is similar in shape and causes enteritis and diarrhea related to sea foods .

**It can be differentiated from Vibrio by: It is resistant to 0/129 compound
Negative growth in media containing 6% NaCl .**

Aeromonas is similar to enteric organisms in morphology and pathology but it is oxidase positive organism.

Plesiomonas :

It is gram negative rod with polar flagellum, it is isolated from fresh water fish and patients with diarrhea . Some strains share antigens with shigella antisera, it can be differentiated by positive oxidase test.