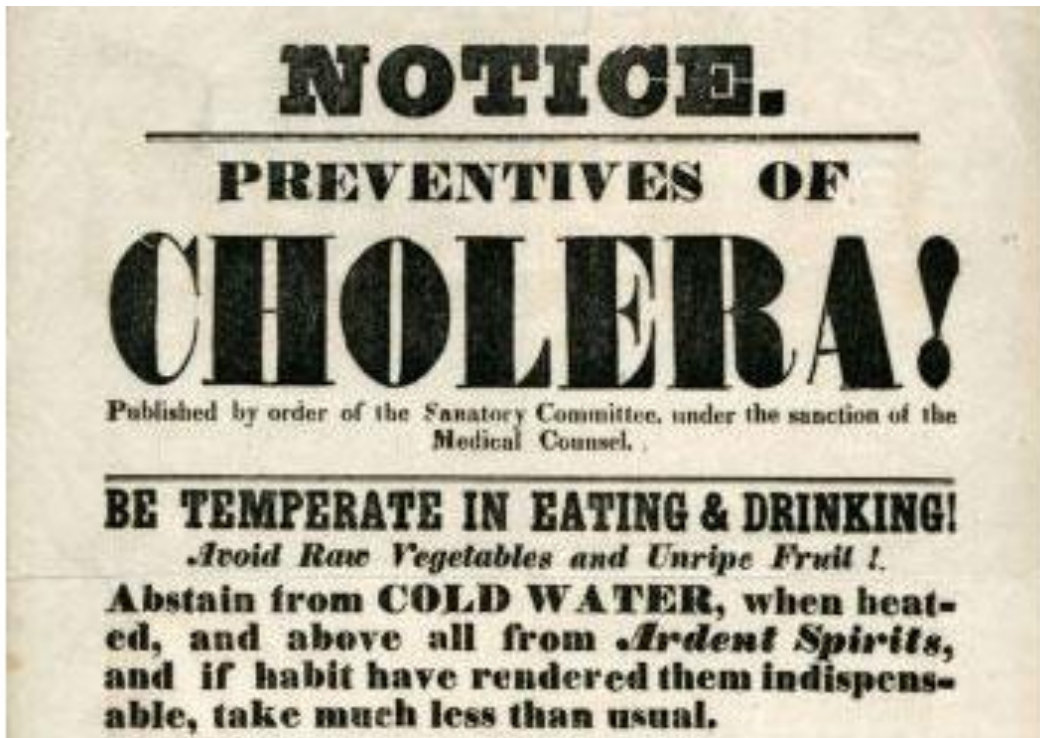


Micro Team^{429©}

Presents :

Vibrio cholera



NOTES :

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ADEL AL-SHEHRI

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SPECIAL THANKS TO :

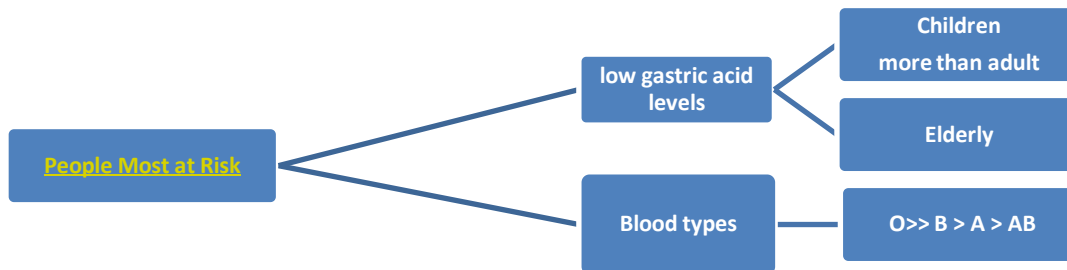
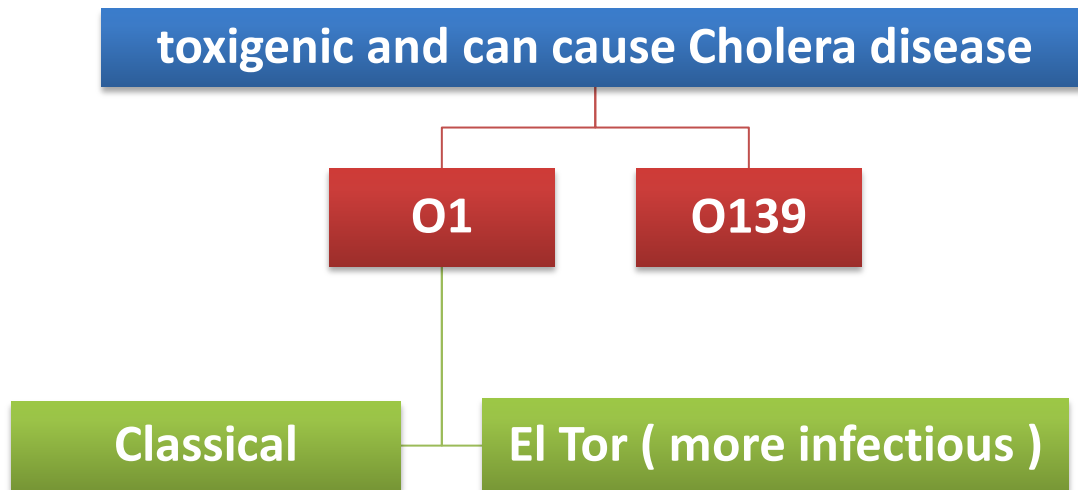
ADEL AL-SHEHRI

Over view :

- ✚ Highly motile; polar flagellum (very important)
- ✚ ALKILAIN
- ✚ infection
- ✚ diarrhea
- ✚ Caused by **Cholera Toxin** of bacterium, *Vibrio cholera* (caused by the toxins not from the bacteria
- ✚ WHO: Global Task Force on Cholera Control



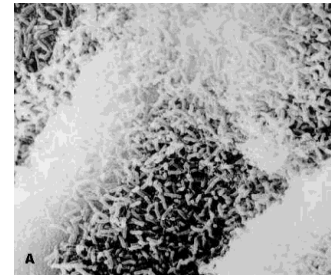
- ✚ Grows in salt and fresh water
- ✚ Can survive and multiply in brackish water by infecting copepods
- ✚ Has over 150 identified serotypes based on O-antigen
- ✚ Only O1 and O139 are toxigenic and cause Cholera disease
- ✚ 2 categories of O1 serotypes – Classical and El Tor
- ✚ A life-threatening secretory **diarrhea induced by enterotoxin secreted** by V. cholera
- ✚ Water-borne illness caused by ingesting water/food contaminated by copepods infected by V. cholerae
- ✚ An enterotoxic enteropathy (**a non-invasive diarrheal disease**)
- ✚ Transmitted by fecal-oral route, Contaminated food or water, Inadequate sewage treatment, Lack of water treatment, Improperly cooked shellfish, Transmission by casual contact unlikely.
- ✚ Endemic in areas of poor sanitation (India and Bangladesh)
- ✚ Common in India, Sub-Saharan Africa, Southern Asia



Incubation: 1-3 days

Shorter incubation period:

- High gastric pH (from use of antacids)
- Consumption of high dosage of cholera



How Does Cholera Toxin Work?

Inactivates GTPase function of G-protein → G proteins stuck → cAMP → ion channels Activation then ions flow out and water follows.

Infectious Dose:

10^6 - 10^{11} , environment(Temperature, acidity, Bile salts, organic acids) complement inhibit bacteria growth.

Why such a high dosage?

- ✚ Series of changes as moves from aquatic environment to intestine
- ✚ Temperature, acidity
- ✚ Acidic environment of stomach
- ✚ Intestinal environment
- ✚ Bile salts, organic acids, complement inhibit bacteria growth
- ✚ Must penetrate mucous lining of intestinal epithelial cells

Symptoms:

Occur 2-3 days after consumption of contaminated food/water

- ✚ 75% asymptomatic
- ✚ 20% mild disease
- ✚ 2-5% severe
- ✚ Vomiting , Cramps , Watery diarrhea (1L/hour) , Without treatment death will happen.



Cholera Gravis:

- ✚ severe symptoms, Rapid loss of body fluids and bodyweight, Dehydration and shock, Death can occur within 2-3 hours

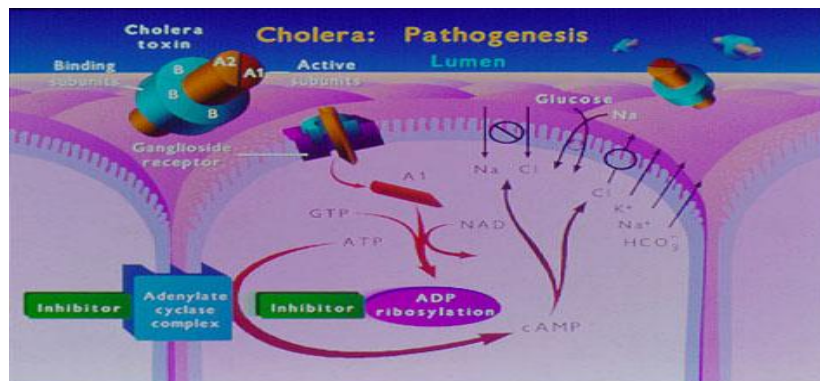
Identification:

- ✚ Vibrios are highly motile , gram-negative, curved or comma-shaped rods with a single polar flagellum
- ✚ the bacteria must penetrate the mucous layer and establish contact with the epithelial cell layer.



Pathogenesis:

- ✚ To establish disease, *V. cholerae* must be ingested in contaminated food or water and survive passage through the gastric barrier of the stomach.
- ✚ On reaching the lumen of the small intestine, the bacteria must overcome the clearing mechanism of the intestine (peristalsis), penetrate the mucous layer and establish contact with the epithelial cell layer.
- ✚ Thus, the net effect of the toxin is to cause cAMP to be produced at an abnormally high rate which stimulates mucosal cells to pump large amounts of Cl^- into the intestinal contents.
- ✚ H_2O , Na^+ and other electrolytes follow due to the osmotic and electrical gradients caused by the loss of Cl^- .
- ✚ The lost H_2O and electrolytes in mucosal cells are replaced from the blood.
- ✚ Thus, the toxin-damaged cells become pumps for water and electrolytes causing the diarrhea, loss of electrolytes, and dehydration that are characteristic of cholera.



Diagnosis:

- ✚ Based on clinical presentation and confirmed by isolation of *vibrio cholera* from stool

Visible Symptoms:

- Decreased skin turgor , Sunken eyes, cheeks , Almost no urine production , Dry mucous
- Watery diarrhea consists of: fluid *without* RBC, proteins, electrolytes, enormous numbers of vibrio cholera

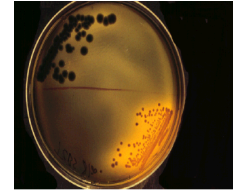
Laboratory Diagnosis:

- Gram Stain : Red, curved rods of bacteria
- Visualization by dark field or phase microscopy : Look like “shooting stars”

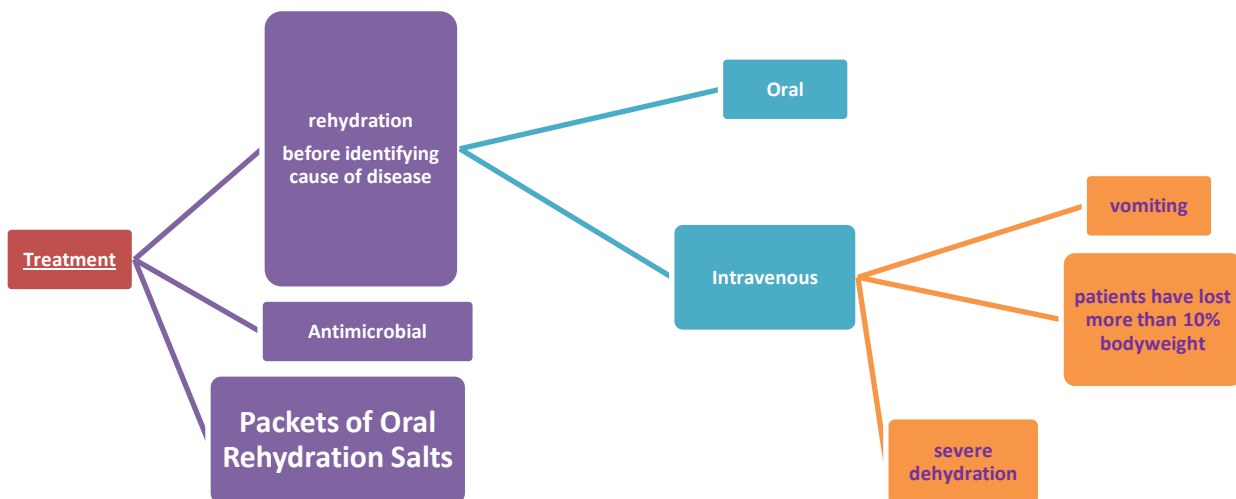
Nice explain from Abdullah Al-Aqeel <3 :

By examine the fesses under microscope and look for motility (which other bacteria may able to do) so we add cholera antibody , so if the movement stop then it is cholera if not then it is other motile bacteria

Other way : by culture in selective media (media has antibiotic which kill all non cholera bacteria) culture name : TCBS and Yellow colonies form



Vibrio species on TCBS agar. Vibrio species can be selectively grown on TCBS agar. On this medium, *V. parahaemolyticus* usually produces a green colony and *V. cholerae* a yellow colony (indicative of the fermentation of sucrose). Courtesy of Harriet Provine.

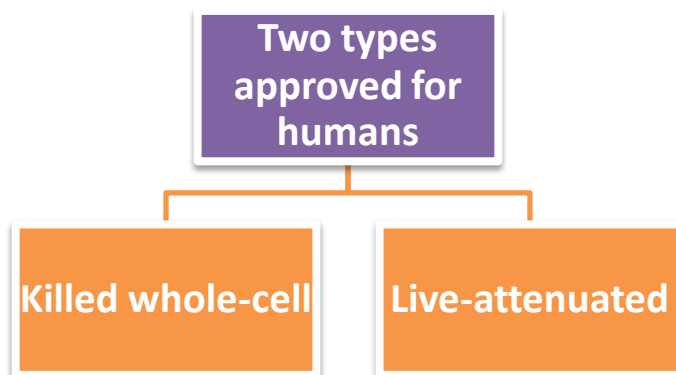


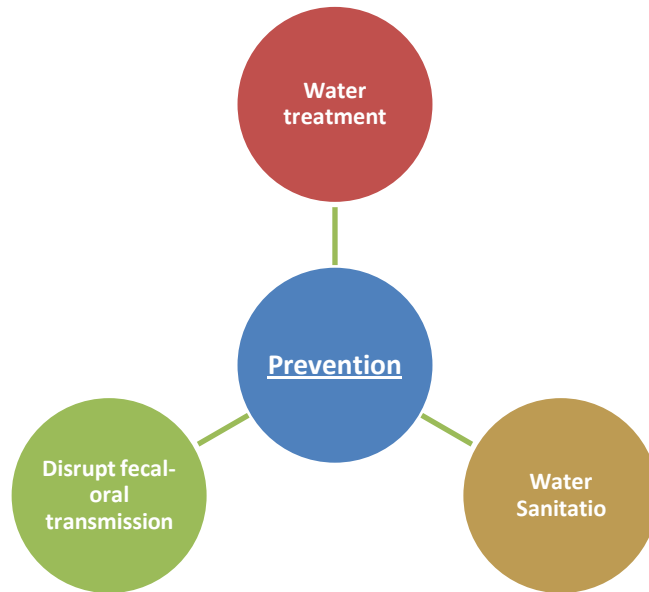
Intravenous Rehydration :

- **Ringer's Lactate:**
 - + Commercial product
 - + Has necessary concentrations of electrolytes
- **Alternative options**
 - + Saline
 - + Sugar and water
 - + Do not replace potassium, sodium, bicarbonate

Vaccines: (Oral Vaccine)

Not recommended





Ideal BioWeapon :

- + Ease of procurement
- + Simplicity of production in large quantities at minimal expense
- + Ease of dissemination with low technology
- + Silent dissemination

THE END , BEST WISHES :)