**Genus Vibrio:**

- Part of the normal flora in marine habitat
- Many of them were identified as the most serious pathogens in fish and shellfish marine aquaculture worldwide

**Vibrio parahaemolyticus**

- 50–70% of all cases of diarrhea associated with the consumption of fishery products in China
- 25 outbreaks comprising 613 cases (0 deaths) in the U.S., 1998–2002

**Vibrio parahaemolyticus**

- It is estimated 5,122 cases of foodborne vibriosis, other than cholera or V. vulnificus infection, in the U.S./year, with 13 deaths (CDC)

**Vibrio parahaemolyticus**

- Pathogenic strains are Kanagawa-positive
- Optimum growth in 2–4% NaCl, grows at 8%
- pH 7.5–8.6 optimum
- Temperature >10°C–42°C or 44°C
**Vibrio parahaemolyticus**

- Infection probably requires ingestion of >10⁵ cells
- Incubation 4–30 hr (usually 12–24 hr)
- Watery diarrhea with abdominal cramps, nausea, vomiting, fever, and headache; rarely, dysentery-like illness
- Duration 1–7 days

- Not communicated person-to-person
- During warm weather, occurs in seawater (normal flora) and seafoods.
- Foods most often associated with human infections are seafoods, both shellfish and finfish

- Organism is killed by cooking or by irradiation.
- In China, of a total of 83 shellfish samples, 38 samples were positive
- In Mexico, more than 1230 cases of gastroenteritis were reported with consumption raw or undercooked shrimp

- Enrichment medium (choice of at least three), incubated overnight at 35ºC±2ºC
- Direct quantification can be done on hydrophobic grid membrane, in peptone-Tween-salt diluent; filter incubated 4 hr at 35ºC on one agar medium, then 18–20 hr at 42ºC on another

- V. parahaemolyticus colonies are green to blue; others are yellow.
- Serologic classification is based on O (somatic) and K (capsular) antigens.
- Several problems concerning detection of V. parahaemolyticus in seafood using culture methods
- It is recommended to use new techniques such as the PCR method

**Vibrio cholerae**

- Causes cholera
- Waterborne transmission is widespread in the developing world.
- Most outbreaks in the 19th and first half of the 20th centuries occurred in Asia and involved "classical" V. cholerae, serogroup O1; causes pandemics.
**Vibrio cholerae**

- On the Louisiana and Texas Gulf Coasts in January of 1991, an outbreak due to serogroup O1, biotype El Tor, began in Peru and spread through much of Latin America.

- Grows in the range of 15°C–42°C, optimum 30°C–37°C.
- pH range for growth is 6–10
- Does not require salt, but will grow in the presence of up 6%
- Serogroups other than O1 and O139 are fairly widespread. There are also O1 strains that do not produce cholera toxin and therefore do not produce the disease.

- Infectious dose is personal
- Incubation period is a few hours to 5 days, usually 2–3 days.
- Sudden onset of profuse, painless, watery diarrhea, occasional vomiting
- In untreated cases, dehydration may lead to circulatory collapse, acidosis, hypoglycemia in children, renal failure, and death

- Survivors are immune, but not for life, to the same V. cholerae type.
- During 1998–2002, CDC recorded 0 food borne cholera outbreaks in the U.S., and no waterborne cholera outbreaks for the years 2003–2004
- CDC estimates 49 cases of food borne cholera in the U.S./year, with no deaths.

**Vibrio vulnificus**

- This organism has been recognized first in 1979
- Because of high lethality, it is now regarded as an important foodborne disease hazard in the U.S., and possibly in other developed countries
- For 1998–2002, CDC reports only one possible outbreak ("Vibrio, other"), perhaps because V. vulnificus most often causes individual (sporadic) cases.

**Diagnosis in humans:** isolation of the organism or detection of the toxin (e.g., by ELISA) in patients stools
- Food samples are enriched in alkaline peptone water at 35°C or 42°C.
- Detection is by plating on a variety of media, some nonselective.
**Vibrio vulnificus**

- Vibrio vulnificus is an etiologic agent in severe human infection acquired through wounds or contaminated seafood.
  - The strains are divided into three biotypes:
    - Biotype 1 strains are pathogenic for humans
    - Biotype 2, appear to be virulent for both humans and eels
    - Biotype 3, causing wound infections and bacteremia

- V. vulnificus has been detected in coastal and estuarine environments throughout the world.
  - Areas with warm seawater temperatures
  - Shellfish may constitute one of the most hazardous foods if consumed raw or undercooked.

- People (usually men >40 years old), chronic liver disease, chronic alcoholism, or immune suppressed, if they eat raw or undercooked seafood (especially oysters)
  - They may become dramatically ill after 12 hours to 3 days.

- In China, an outbreak with high mortality within one week

- Clams and oysters (eastern seacoast, U.S.), fairly common; among positive oysters, average level was 6 × 10^4 CFU/g
- Seawater (eastern seacoast, U.S.), when positive, had <10 CFU/ml.

- Halophilic (grows in 6% but not 8% NaCl)
- Ferments lactose but less frequently sucrose.
- Detection methods are similar to those for V. parahaemolyticus,
Summary

• The genus Vibrio comprises species from brackish and marine waters.
• Unlike many foodborne pathogens, these are not necessarily present in food as a result of human fecal contamination.
• At least three of these species are significant human pathogens, associated with seafoods in North America.
• All are easily killed by cooking the seafood.

Summary

• *V. parahaemolyticus* is a worldwide problem with seafood, causes diarrheal illness that is not generally life-threatening.
• *V. cholerae* is usually waterborne elsewhere in the world; cholera is a life threatening disease if not properly treated, and still kills many people worldwide.
• Foodborne *V. vulnificus* kills only a few people who have predisposing conditions; but it kills very quickly if diagnosis and treatment are delayed.