**Infectious Diarrheas - Overview**

- Greatest cause of morbidity and mortality worldwide

- Scope of disease:
  - 1993, 1999 - *E. coli 0157:H7*
  - 1996-7 - *Cyclospora*
  - 1998 - *Vibrio parahaemolyticus*
  - 1993 - *Cryptosporidium*

**GI Infections – Factors increasing risk**

- Food-borne
- Travelers
- Institutionalized settings

**GI Infections – Epidemiologic Factors**

- WHO you are
- WHERE you are
- WHEN it occurs

**GI Infections - Transmission**

- Fecal – oral route
  - Can include sexual transmission
- Infectious inoculum

**GI Infections Host Defense Mechanisms**

- Hygiene
- Gastric acidity
- GI motility
- Normal flora
- Non-specific intestinal immunity
- Mucosal associated antibody production

**GI Infections Microbial Virulence Factors**

- Adhesion
- Toxins
  - Enterotoxins
  - Cytotoxins
  - Neurotoxins
- Invasiveness
### Infectious Diarrheas

#### Pathophysiologic Mechanisms

- **Enterotoxin-mediated - secretory**
  - *Vibrio cholera*, enterotoxigenic *E. coli*
- **Inflamatory – cytotoxin-mediated**
- **Systemic syndromes**

#### Enterotoxin-mediated Gastroenteritis

- **History – Risk Factors**
  - NO fever, systemic findings
  - Profuse watery stools
  - NO fecal WBC’s
  - Small bowel
  - Often normal gross exam and histopathology

#### Shiga-toxin producing *E. coli* (STEC)

- **Food and water borne illness with high morbidity and mortality**
  - Association with Hemolytic Uremic Syndrome (HUS) and Thrombotic Thrombocytopenic Purpura (TTP)
  - 25% hospitalized
  - 6% (15% children) develop HUS
  - 1% fatal
- **Shiga toxin production**
Infectious Diarrheas – Clinical Syndrome
Inflammatory/Cytotoxin-mediated gastroenteritis
- **History**
  - Dysentery
  - Risk Factors
- **Physical Exam/Labs**
  - Fever, abdominal pain
  - Volume loss less prominent
  - Leukocytosis
  - WBCs and RBCs in stool
  - (+) toxin in stools

Infectious Diarrheas – Pathology
- Inflammatory
  - Cytotoxin-mediated gastroenteritis
- Colon, large bowel
- Limited to GI mucosa
- Erosions, ulcerations

GI Infections – Pathophysiologic Mechanisms
- Enterotoxin-mediated - secretory
- Inflammatory
  - cytotoxin-mediated
- Systemic syndromes
  - *Salmonella, Yersinia*

GI Infections – *Salmonella spp.*
- Typhoid fever, gastroenteritis
- *Typhi vs. non-typhi*

GI Infections – *Salmonella Pathogenesis*
- Uptake by cells
- Multiplication in mononuclear cells
- Hematogenous dissemination
- Replication in liver and spleen
- Excretion in bile
- Secondary bacteremia and entry into gut lumen

GI Infections
*Salmonella Virulence Factors*
- Invasins – SPI-1 - Type III secretion system
  - Intracellular pathogen
  - Resistance to defensins
- Survival in phagocytes - *phoP/phoQ*
  - Resistance to oxygen radicals
  - Resistance to low pH
### GI Infections

**Salmonella Virulence Factors**

- Systemic dissemination – SPI-2 (Type III secretion system)
- Resistance to complement-mediated cytotoxicity
  - Long O antigen
  - *rck* – outer membrane protein
- Capsular polysaccharide – Vi antigen

### GI Infections

**Salmonella – Clinical Syndrome**

- History – Risk Factors
- Systemic illness
  - Diarrhea often not prominent
- Laboratory
  - Anemia, leukopenia, elevated liver function studies
  - (+) Blood cultures
  - (+) Stool cultures

### Infectious Diarrheas – Viral

- Rotavirus
- Caliciviruses/Norwalk-like viruses
  - 40% cases infectious diarrhea in U.S.
- No toxin identified but produce histologic changes and alterations in fluid/electrolyte absorption/secretion
- Small bowel; no fecal WBCs

### Infectious Diarrheas - Diagnosis

- History
  - Risk factors
  - Systemic symptoms
  - Character of stool
- Physical Exam
- Direct stool exam
  - Gross description
  - Fecal leukocytes
  - Exam for parasites

### Infectious Diarrheas - Treatment

- Fluid and electrolyte replacement
- Antibiotic therapy
  - Contra-indication?: Shiga-toxin producing *E. coli*
- Epidemiologic considerations

### Infectious Diarrheas - Diagnosis

- Immunoassays for toxins, viruses
- Stool culture
  - May be of limited use for *E. coli*
  - Not routinely performed for viruses
- Blood culture
  - Only useful for systemic infections e.g. *Salmonella*
Infectious Diarrheas - Prevention

• Adequate water, sanitation facilities**
• Hygiene
• Food handling
• Vaccines