Microbial Diseases of the Digestive System

Infections of the mouth, bacterial gastroenteritis

Digestive System

- **Gastrointestinal tract (GI)**
  - Digestion of nutrients and transfer to bloodstream for distribution to tissues
  - Abundant normal microflora, especially in the large intestine
  - Infection may interfere with *resorption* of water and nutrients, leading to *dehydration*
- **Accessory organs** provide digestion enzymes

Dental Caries

- Most common infectious disease
- Bacteria, including *Streptococcus mutans*, produce *dextran* to enhance attachment to tooth surfaces
- Concentration of acids produced by bacterial metabolism eventually leads to dissolution of
**Periodontal Disease**

- Inflammation and degeneration of gum tissue
- May involve invasion of gums by bacteria associated with plaque accumulated in the gingival crevice

**Gastroenteritis**

- Inflammation of the gastrointestinal tract
- Usually self-limiting, but may be very serious
- Major clinical concern is with dehydration
  - Failure of resorption removes water and electrolytes from blood
  - Resulting hypovolemia can lead to shock and organ failure
- May occur due to
  - Infection: Growth of toxigenic microorganisms in GI tract
  - Intoxication: Ingestion of enterotoxins produced by bacteria growing in food

**Staphylococcal food poisoning**

- Enterotoxins produced by *Staphylococcus aureus*
- *S. aureus* is readily transferred to food by handling
- With tolerance for high osmolarity, *S. aureus* may survive and grow in foods
- Risk is increased by temperature abuse: Keeping food at incubator temperature!
Shigellosis

- **Shigella species**
  - *S. sonnei* most common
  - *S. dysenteriae* most dangerous; agent of bacillary dysentery
- Bacteria invade intestinal epithelium and can spread directly between cells
- Extensive tissue destruction, along with enterotoxin production, contribute to gastroenteritis

Salmonellosis

- Common cause of foodborne infection
- Human isolates are *S. enterica*, and most are not particularly hazardous
- Greatest danger is *typhoid fever* when pathogenic salmonellae establish systemic infection
Cholera

- *Vibrio cholerae*, an inhabitant of brackish water
- Very potent enterotoxin, *choleragen*, leads to extensive fluid and electrolyte loss
- May show epidemic prevalence
- Other vibrios
  - *V. parahaemolyticus*
  - *V. vulnificus* can cause systemic infection, especially in the immunocompromised

Enteropathogenic *Escherichia coli*

- Frequent cause of bacterial gastroenteritis and a serious threat to worldwide infant health
- *Enterotoxigenic E. coli* are agents of “traveller’s diarrhea
- *Enteroinvasive E. coli* are capable of invading the intestinal epithelium
- *Enterohemorrhagic E. coli*, such as O157:H7
  - Produce cytotoxic *Shiga toxin*
  - Association with *hemolytic uremic syndrome*

Bacterial gastroenteritis, other

- *Campylobacter jejuni* is a very common cause of foodborne infection, especially from poultry; many cases are not reported
- *Yersinia enterocolitica* and *Y. pseudotuberculosis* can grow at low temperature
- *Clostridium perfringens* and *Bacillus cereus* are enterotoxin producers associated with foodborne intoxication
Helicobacter pylori