

Introduction

Alteration: organoleptic, chemical & physical changes

Useful life: safe, maintains its properties and nutrition

Physical & chemical and microbiological alteration 10⁶

Perishable, Semi-perishable and Non-perishable food

Most changes in the surface area of food

SPOILING MICROORGANISMS

Microorganisms

Moulds and yeasts; they tolerate :Aw and/or pH better than bacteria.

Gram-negative bacteria: Pseudomonadaceae, Neisseriaceae

Gram-positive bacteria: Micrococcaceae, LAB, Brochothrix thermophacta.

Sporulated bacilli: Bacillus (anaerobic facultative, mesophilic), Clostridium (obligate anaerobes, redox)



Metabolism

Carbs: fermentation, pectin degradation (galacturonic acid), amylolytic enzymes, exopolysaccharides

Proteins: hydrolysis, aa's degradation → putrefaction (smell)
H₂S + oxhaemoglobin → sulphohaemoglobin (green)

Fats: hydrolysis. Glycerol + Fatty Acids → ketones (smell)

GRAM-NEGATIVE FOODBORNE PATHOGENIC BACTERIA

Vibrio spp.

bacilli, motile, flagellate aquatic facultative anaerobes

catalase + and oxidase +

Vibrio cholerae

Gastroenteritis and cholera

Choleric toxin: 2 parts A & B. A enters enterocyte → G-protein → cAMP → P → membrane channels → HCO₃⁻ & Cl⁻ out, Na⁺ blocked

ZOT (relaxes tight junctions), ACE (cholera toxin), adhesins, bacillins...

oral faecal transmission, >10⁶ bacteria

Rehydration, antibiotics, Hygiene and cooking to prevent

Vibrio parahaemolyticus

Gastroenteritis during summer

Adhesins and enterotoxins it's not invasive

Associated with seafood and fish consumption

Treatment with antibiotics

Vibrio vulnificus

Gastroenteritis, wound infections and sepsis

It has a polysaccharide capsule as a protection, it is invasive (bloodstream). It's a flesh-eating bacteria

Causes more deaths than any other vibri

Treatment with antibiotics

Escherichia coli

General characteristics + motile and lactose fermentation capacity

Gastroenteritis, urinary tract infection, systemic infection and meningitis

Enterotoxigenic: **traveler's diarrhea**, no h-h transmission, high inoculum

Enteropathogenic: **childhood diarrhea**, h-h transmission, low inoculum

Enteroparasititic: **childhood diarrhea** → microbiota damage, growth alteration

Enterohaemorrhagic: **bleeding diarrhea**, h-h transmission, low inoculum. O157, H7 Shiga toxin: Haemolytic Uræmic Syndrome

Enterovaginal: **watery diarrhea**, colon infection, ulcerations and fever

Diffusely adherent: no invasives, no toxins, **Absorption** affect only children, elderly and immunosuppressed

Rehydration and antibiotics

Hygiene and food cooking

Salmonella spp.

General characteristics + enterotoxin + cytotoxin + antiphagocytic protein + complex IV protector

Salmonellosis: **Typhimurium**: **gastroenteritis, nausea and vomiting**, no h-h transmission, systemic diagnosis, self-limited fever

Salmonellosis: **Typhi**: **typhoid fever**, h-h transmission, no animals, settles in the **gallbladder**. Gastroenteritis at intervals, treatment with antibiotics

Shigella spp.

immotile bacilli, no lactose fermentation no capsule protection. Human reservoir

Shigellosis: adhesion to M cells. Shiga toxin → Haemolytic Uræmic Syndrome

Abdominal spasms, bleeding diarrhea and fever

h-h and sexual transmission

Yersinia spp.

short bacilli, psychrotol (15-30°C), lactose - urease +, immotile 37°C, motile 25°C

Attack M Cells in the ileum, settles in mesenteric lymph nodes. Survives immunity

Watery diarrhea, bleeding mucosa and fever

Withstands vacuum in foodstuffs for immediate consumption

FOODBORNE PATHOGENIC BACTERIA

GRAM-POSITIVE FOODBORNE PATHOGENIC BACTERIA

Staphylococcus spp.

immotile cocci, no spores, capsule, facultative anaerobes, **catalase +**

Aureus species: **coagulase +**, glucose & malted fermentation, bacillus, resists desiccation and salinity

Diseases: suppurative with pus or toxin-caused, no suppurative

Transmission: h-h, h-food, animal-food

Pathogenesis: survives a lot in food, resistant to gastric acid, enzymes, 1°C and is superantigenic, intoxication vs. toxoinfection

Gastroenteritis: diarrhea & vomits

Enterocolitis: gastroenteritis + fever

Rehydration and maybe antibiotics

Isolation and culture of the bacteria in a laboratory → Toxin study

Bacillus spp.

bacilli, facultative anaerobes, create endospores, **catalase +**

Cereus species: grows in starch rich or animal protein rich foods

Emetic gastroenteritis: nausea and vomits, no diarrhea. Intoxication

Diarrhoeic gastroenteritis: diarrhea and nausea, no vomits. Toxinfection

Treatment: self-limited. Lab isolation. Be careful with rice.

Clostridium spp.

bacilli, creates endospores, strict anaerobes, fermentation, **catalase and oxidase -**

Pathogenic capacities: Spores, speedy growth and powerful enterotoxins

Clostridium botulinum

big bacilli, peritric flagella, strict anaerobes, no capsule

Botulinum - botulinum toxins (block muscle contraction)

Food-borne botulism: intoxication **infant botulism**: toxoinfection (ingestion of spores in honey)

Toxin: a monoprotease Zn dependent. It blocks the Acetylcholine signals in the neurons

Weakness, vomits, blurred vision, constipation

Ventilatory support, antitoxins, gastric lavages. Long recovery

Toxin detection in patient blood test

Don't eat swollen canned food, cook the food well, fridge, no honey to children

Clostridium perfringens

immotile bacilli, Enteropathogenic, histotoxic clostridia can cause myonecrosis

Toxinotypes: A, B, C, D, E they all contain lethal toxins

Spore → germination → multiplication → ingestion → sporulation → enterotoxin

Gastroenteritis or Necrotic enteritis: bleeding diarrhea, vomits, ulcers and intestine perforations

Clinical diagnosis, rehydration and antibiotics treatment

Hygiene, Cooking >60°C / freezing -40°C



