

## Module 5

### Chapter 7 The Control of Microbial Growth

#### The Terminology of Microbial Control

- \_\_\_\_\_ refers to microbial \_\_\_\_\_
- \_\_\_\_\_ is the \_\_\_\_\_ of significant contamination
- Aseptic surgery techniques \_\_\_\_\_ microbial contamination of wounds
- \_\_\_\_\_: \_\_\_\_\_ microbes
- \_\_\_\_\_: \_\_\_\_\_, not \_\_\_\_\_, microbes
- Sterilization: \_\_\_\_\_ microbial life
  - \_\_\_\_\_ is most common method
  - \_\_\_\_\_ is sterilizing agent
- Food products are not sterilized
  - Sterilizing would \_\_\_\_\_
- \_\_\_\_\_ sterilization: killing *C. botulinum* \_\_\_\_\_
  - \_\_\_\_\_ heat treatment
  - Attempts to retain \_\_\_\_\_ of food product
- Disinfection: removing \_\_\_\_\_
- Antisepsis: removing \_\_\_\_\_ from \_\_\_\_\_
  - A chemical can be \_\_\_\_\_
- Degerming: removing microbes from \_\_\_\_\_
- Sanitization: lowering \_\_\_\_\_
  - Commonly used when \_\_\_\_\_

#### The Rate of Microbial Death

- \_\_\_\_\_ treatments \_\_\_\_\_ bacteria
- Bacterial populations die at a constant \_\_\_\_\_ rate
- Effectiveness of Treatment depends on:
  - - More microbes, \_\_\_\_\_ to kill
  - - Presence of some \_\_\_\_\_ can inhibit \_\_\_\_\_
  - - Longer exposure, \_\_\_\_\_
  -

#### Actions of microbial control agents

- Alteration of membrane \_\_\_\_\_
  - Results in \_\_\_\_\_
- Damage to \_\_\_\_\_
  - Alters or inhibits \_\_\_\_\_
- Damage to \_\_\_\_\_
  - Prevents \_\_\_\_\_ and/or \_\_\_\_\_ synthesis

## Physical Methods of Microbial Control

### Heat

- Heat \_\_\_\_\_ – kills microbes
- Thermal death point (TDP) – lowest temp at which \_\_\_\_\_ in a culture are \_\_\_\_\_
- Thermal death time (TDT) – time during which \_\_\_\_\_ in a culture \_\_\_\_\_
- Decimal reduction time (DRT) – time to kill \_\_\_\_\_ of a population
- All three are indications of \_\_\_\_\_ required to kill a population of bacteria

### Moist Heat

- Moist heat \_\_\_\_\_ than dry heat
- Kills by \_\_\_\_\_ of proteins
  - Breaks \_\_\_\_\_ that hold structure
- \_\_\_\_\_ kills much faster than \_\_\_\_\_ heat
- \_\_\_\_\_: \_\_\_\_\_

### Steam Sterilization

- Steam \_\_\_\_\_ sterilant
  - Steam \_\_\_\_\_ item's surface

### Pasteurization

- \_\_\_\_\_ to reduce \_\_\_\_\_ and \_\_\_\_\_
- Equivalent treatments
  - 
  - 
  -
- Does not significantly \_\_\_\_\_

### Dry heat sterilization

- Kills by \_\_\_\_\_
  - 
  - 
  - 
  -

### Filtration

- Liquids can be sterilized by \_\_\_\_\_ microbes
- Used on \_\_\_\_\_
  - Antibiotics, enzymes, vaccines
- High-efficiency particulate air (HEPA) filters remove microbes larger than \_\_\_\_\_  $\mu\text{m}$
- Membrane filters made of cellulose, plastic polymers
  - Common pore sizes \_\_\_\_\_  $\mu\text{m}$
  - Filter out \_\_\_\_\_ microbes

### Other treatments

- Low \_\_\_\_\_ microbial growth
  - 
  - 
  -

- High \_\_\_\_\_ proteins
- \_\_\_\_\_ prevents \_\_\_\_\_
- Osmotic pressure causes \_\_\_\_\_

#### *Radiation*

- Wavelengths of \_\_\_\_\_ than visible light
- \_\_\_\_\_ radiation (\_\_\_\_\_ )
  - Ionizes \_\_\_\_\_ to release \_\_\_\_\_ radicals
  - Damages \_\_\_\_\_
- \_\_\_\_\_ radiation (\_\_\_\_\_ )
  - Damages \_\_\_\_\_
  - Not very \_\_\_\_\_, microbes must be on \_\_\_\_\_
- \_\_\_\_\_ kill by \_\_\_\_\_; \_\_\_\_\_ especially antimicrobial

#### **Chemical Methods of Microbial Control**

- Chemical agents are used on living tissue (as \_\_\_\_\_) and on inanimate objects (as \_\_\_\_\_)
- Few chemical agents \_\_\_\_\_, but can disinfect
- No single disinfectant is \_\_\_\_\_ for \_\_\_\_\_ circumstances

#### *Principles of effective disinfection*

- \_\_\_\_\_
  - \_\_\_\_\_ concentration, more \_\_\_\_\_
- pH
- Time
  - Longer \_\_\_\_\_, more \_\_\_\_\_
  - \_\_\_\_\_ exposure times can compensate for \_\_\_\_\_

#### *Disk-diffusion Method*

- Disk-diffusion method - \_\_\_\_\_ is soaked with chemical and placed on inoculated agar plate
  - A \_\_\_\_\_ indicates effectiveness
- Can perform test on \_\_\_\_\_ test bacteria
  - Determine \_\_\_\_\_ for inhibiting specific microbe
- Chemical disinfectants and antiseptics do not show \_\_\_\_\_
  - Cannot be used \_\_\_\_\_
- Disrupt \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
- Iodine
  - \_\_\_\_\_: \_\_\_\_\_ in aqueous \_\_\_\_\_
  - \_\_\_\_\_: iodine in \_\_\_\_\_ molecules
  - Alter \_\_\_\_\_ and \_\_\_\_\_
- Chlorine
  - Bleach: \_\_\_\_\_
  - Chloramine: \_\_\_\_\_ and \_\_\_\_\_

- \_\_\_\_\_ agents
- Ethanol, isopropanol
  - \_\_\_\_\_ proteins, \_\_\_\_\_ lipids
  - Require \_\_\_\_\_
- Heavy Metals
- \_\_\_\_\_
  - Silver sulfadiazine used as a \_\_\_\_\_ on burns
  - Copper sulfate is an \_\_\_\_\_
- Work via \_\_\_\_\_ action
  - Mechanism not clear, but bind to and react with \_\_\_\_\_
  - Causes \_\_\_\_\_

#### Surface-Active Agents, or \_\_\_\_\_

- \_\_\_\_\_ molecules
  - Both \_\_\_\_\_ and \_\_\_\_\_
  - \_\_\_\_\_ particles, rinsed away with \_\_\_\_\_
- \_\_\_\_\_ works via \_\_\_\_\_

#### Chemical Food Preservatives

- Organic \_\_\_\_\_
  - Inhibit \_\_\_\_\_
  - Sorbic acid, benzoic acid, and calcium propionate
  - Control molds and bacteria in \_\_\_\_\_ and \_\_\_\_\_
- \_\_\_\_\_ prevents \_\_\_\_\_ germination
- Antibiotics
  - Nisin and natamycin \_\_\_\_\_ spoilage of cheese

#### Microbial Characteristics and Microbial Control

- Different microbes have \_\_\_\_\_ to types of disinfectants and antiseptics
- Biocides tend to be more effective against gram-\_\_\_\_\_ than gram-\_\_\_\_\_
  - \_\_\_\_\_ helps provide resistance
- Within gram-negative \_\_\_\_\_ unusually resistant
  - Contain \_\_\_\_\_ in OM, effective at keeping away chemicals from inner membrane
- \_\_\_\_\_, \_\_\_\_\_ cell wall have major effects on treatments
- In general, characteristics of specific bacterial species offer different levels of resistance to disinfectant, antibiotics.
  - **Biocides are not uniformly effective against all microbes**