Decontamination
Decontamination
Definition

Sterilization

*The use of a physical or chemical procedure to destroy all microbial life, including large numbers of highly resistant bacterial spores.*
Disinfection

The use of a physical or chemical procedure to virtually eliminate all recognized pathogenic microorganisms but not all microbial forms (bacterial endospores) on inanimate objects.
Antisepsis

A germicide that is used on skin or living tissue for the purpose of inhibiting or destroying microorganisms.
Decontamination
Agent Selection

- Degree of microbial killing required
- Nature of item/surface to be treated
- Ease of use
- Safety
- Cost
Decontamination
Agent Efficacy

- Type of organism
- Number of organisms
- Amount of organic material present
- Type & configuration of material to be treated
- Type & concentration of germicide
- Time and temperature or exposure
- pH
- Humidity
Decontamination

Methods

- Heat
- Chemical
- Radiation
Decontamination

Heat

- Types
  - Moist – steam
  - Dry
  - Incineration

*The most effective method of sterilization*
Decontamination

Heat

- Steam sterilization practices
  - **Ensure proper functioning of autoclave**
  - **Vessels should not be capped or plugged**
  - **Large loads require longer contact time**
  - **Excessive amounts of liquid should not be added to load**
Decontamination

Heat

- Steam sterilization verification
  - Direct assay
  - Thermocouples
  - Chemical indicators
  - Biological indicators (**Bacillus stearothermophilis**)
Dry heat sterilization

- Denaturation of proteins: $160^\circ - 170^\circ C/2-4$ hours
- Effective on impervious non-organic materials like glass
Incineration

- Method of choice for animal carcasses
- Requires certified incinerator
Decontamination
Chemical

- **Types**
  - **Liquids, i.e. chlorox, hydrogen peroxide**
  - **Gases, i.e. ethylene oxide**
Agent selection - complexity

- Over 14,000 registered products
- Over 300 active ingredients
- 14 ingredients present in 92% of products
Agent selection - activity

- **HLD** – *high level disinfection*
- **ILD** – *intermediate level disinfection*
- **LLD** – *low level disinfection*
High level disinfection - sporocides

- Kills all microorganisms except high numbers of bacterial spores
- Require 5-10 min. exposure
- Examples: aldehydes, hydrogen peroxide, paracetic acid
Decontamination
Chemical

- Intermediate level disinfection - tuberculocides
  - Kills *M. tuberculosis var. bovis* and all vegetative bacteria, fungi, and most viruses
  - Require minimum 20 min. exposure
  - Examples: phenolics, iodophores, chlorine compounds, alcohols
Low level disinfection – hospital germicides used for housekeeping

- **Kills most vegetative bacteria and some fungi, but not M. tuberculosis var. bovis**
- **Require minimum 20 min. exposure**
- **Examples: quartenary ammonium compounds**
Decontamination

Summary

Bacterial Spores
- *B. subtilis*

Mycobacterium
- *MTB var. bovis*

Non-lipid Viruses
- *Polio-
  Rhino-

Fungi
- *Cryptococcus sp,
  Candida sp.

Vegatative Bacteria
- *Pseudomonas sp.
  Staphylococcus sp.
  *Salmonella sp.*

Lipid Viruses
- *Herpes
  CMV
  HBV
  HIV*

Sterilization
- HLD
- ILD
- LLD
Decontamination
Chemical

- **General Lab Use - Hypochlorite Solutions**
  - Large Spills/Large Organic Load
    - undiluted from bottle
  - Small Spills/Virus Inactivation
    - 10% - 1:9
  - General Surface Disinfection
    - 1% - 1:99
Decontamination

Disinfectants do not replace standard microbiological practices or good hygiene!