Methods of sterilization and disinfection.

Physical

Heat

Dry Heat

- **Red heat**
  - bacteriological loops.
  - tips of forceps
  - spatulas
- **Flaming**
  - scalpels
  - glass slides
  - flasks
  - mouth of test tubes
  - not heating it to redness
  - most vegetative cell are killed
  - no guarantee that spores to would die.
- **incineration.**
  - Solid dressings.
  - animal carcasses
  - pathological material
  - bedding
- **Hot air oven** (long exposure + higher temp than moist heat)
  - metallic instruments. Forceps, scalpels, scissors
  - glasswares petri-dishes, pipettes, flasks, all glass syringes
  - swabs
  - oils
  - grease
  - petroleum jelly
  - pharmaceutical products

moist heat.

- **Below 100 °C**
  - **Pasteurization.**
    - not kill spores
    - employed in Food and dairy industry
    - LTH → 63-65 °C for 30m
    - UHT → 135 °C for 1-2
    - achieve disinfection but not sterilization
    - **why?** cuz it do not eliminates spores.
  - **Vaccine bath**
    - The contaminated Bacteria in vaccine preparation
    - it inactivated by Heating in a water bath at 60 °C for one hour
    - vegetative bacteria are killed
    - spores Survive.
- **at 100 °C**
  - Kills most micro organism in 10m at 100 C **except spores**
  - to kill it tyndallization.
    - exposure of 100° for 20 m on 3 successive days (sporicidal)
- **above 100 °C** (use the autoclave)
  - destroy all microorganism and the spores
  - except prions.
    - steam under 1atm of pressure
    - 121 °C + 15m exposure
  - with prions
    - long time of 135 °C for 1 hour
    - under 2atm
  - the sterilization method of choice for heat-stable objects.

Methods of sterilization and disinfection

physical

filtration.

of liquid

The membrane of the filters composed of

- plastic polymers
- cellulose esters

- 0,45 and 0,80 µm – most bacteria → yeasts, molds
- 0.22 µm for critical sterlizing → parenteral solution.
- 0.01 µm for retaining small viruses

of air

it is remove microorganisms larger than 0.3 µm

- in laboratory hoods
- in rooms of immuno compromised patients.

Radiation.

ionizing radiation

- gamma rays or eletron beams
- short- wavelength and high energy

we use it For the medical industry

- the sterilization of disposable supplies
  - syringes
  - bandages
  - catheters
  - gloves
- and heat-sensitive pharmaceuticals

Non-ionizing

- Rays of wavelenght longer than visible light are non-ionizing
- low energy
- ultra violet rays (uv) (280 – 200 nm)
- poor penetrability
- the use is limited.

* disinfect smooth surfaces with ultra violet lamps and to reduce airborne pathogens
  - hospital wards.
  - operation theatres
  - virus laboratories.

Methods of sterilization and disinfection

Chemical

Alcohols :-

- ethanol 70%
- isopropanol 70%
- propanol 60%

* wide spectrum against bacteria and fungi not sporocidal → Tuberculocidal (15m), virucidal
* alcohols may be contaminated with spors → should be Filtered through a 0.22 µm filter.

Application

- surgical
- hygienic disinfection of skin and hand.

aldehydes

- in a water-soluble gas → Formalin 35%, glutaraldehyde
- Chemosterilizer in higher concentration sporicidial.

application

- disinfection of surfaces and object
  - plastic
  - rubber item.
- the sterilizer of choic for heat-sensitive medical equipment.

Halogens

Chlorine

use in the form hypochlorite → liquid sodium hypochlorite, household bleach

* sporocidal required a long exposure time

application

- disinfection of water and swimming pool
- Cleaning and washing products

iodine

- tincture: alcohol + iodine
- iodophores: iodine + surfactants

* bactericidal, not sporocidal
* less irritant than pure iodine.

application

as antiseptics, disinfection of skin and small wound.

Phenols

not sporocidal not virucidal

application

- disinfectic of hospital
- institutional
- household environment (Soaps)