Antiseptics and Disinfectants

****

What the meaning of

- Sepsis, sterile , sanitize, bacteriostatic, bactericidal
- Phenol coefficient

Ideal antiseptic or disinfectant must be:

1-highly effective at low concentration against all M.O.

2-effective in the presence of organic matter and not injures to tissues.

3-soluble in water, stable, not corrode metals and penetrates tissue cervices and incompatible with other drugs.

- 4-safe, no adverse effects, does not harm living tissues, fast acting, long duration, odorless, non staining, not absorbed into the system of animal in amounts that may have adverse effects.

General mechanisms of antimicrobial action of antiseptics and disinfectants

1-Coagulation of protein of bacterial cells.
Deamination of cellular protein.

2-Change permeability of cell membranes, leading to loss of essential substances from the cell and or entry of unwanted substances into cell.

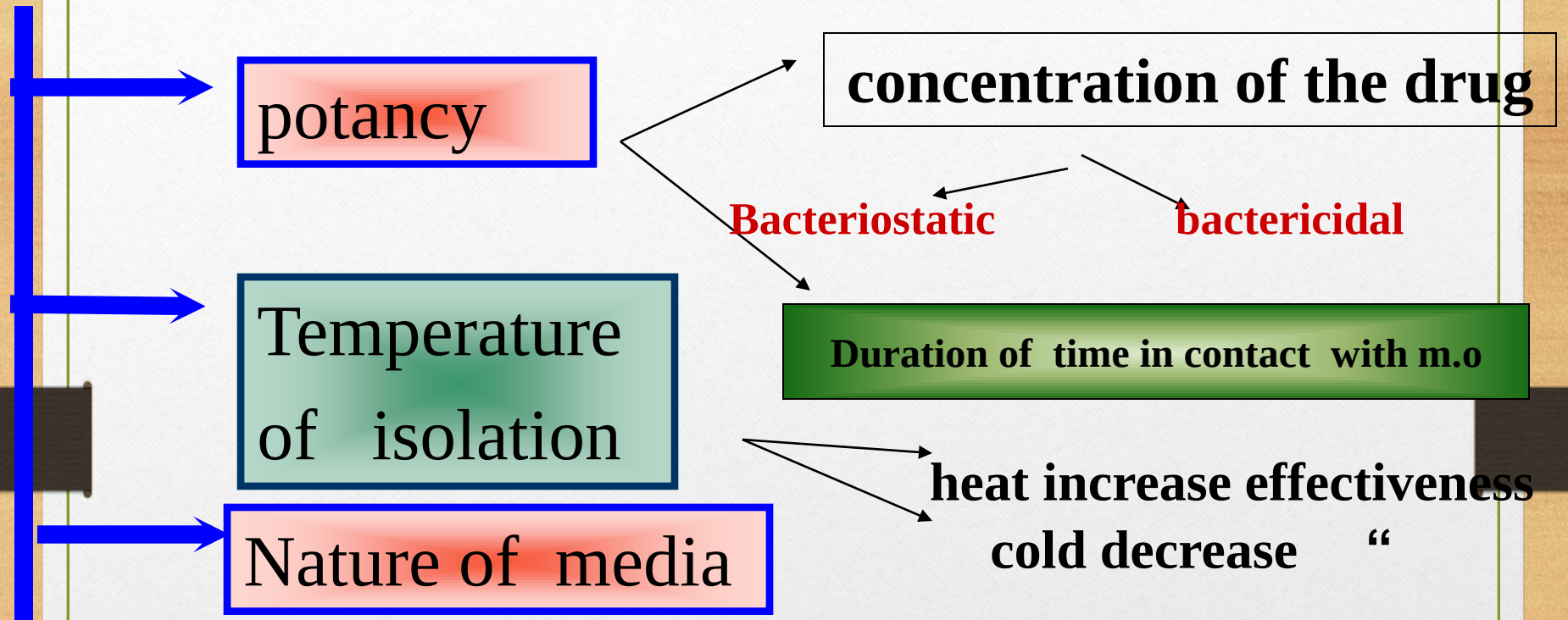
3-Interfere with enzyme system

a-by inactivating enzymes, through attaching to sulphhydryl groups.

b-by competitive and non-competitive inhibition of metabolic pathways by chemical analogues.

c-by oxidation and reduction reactions.

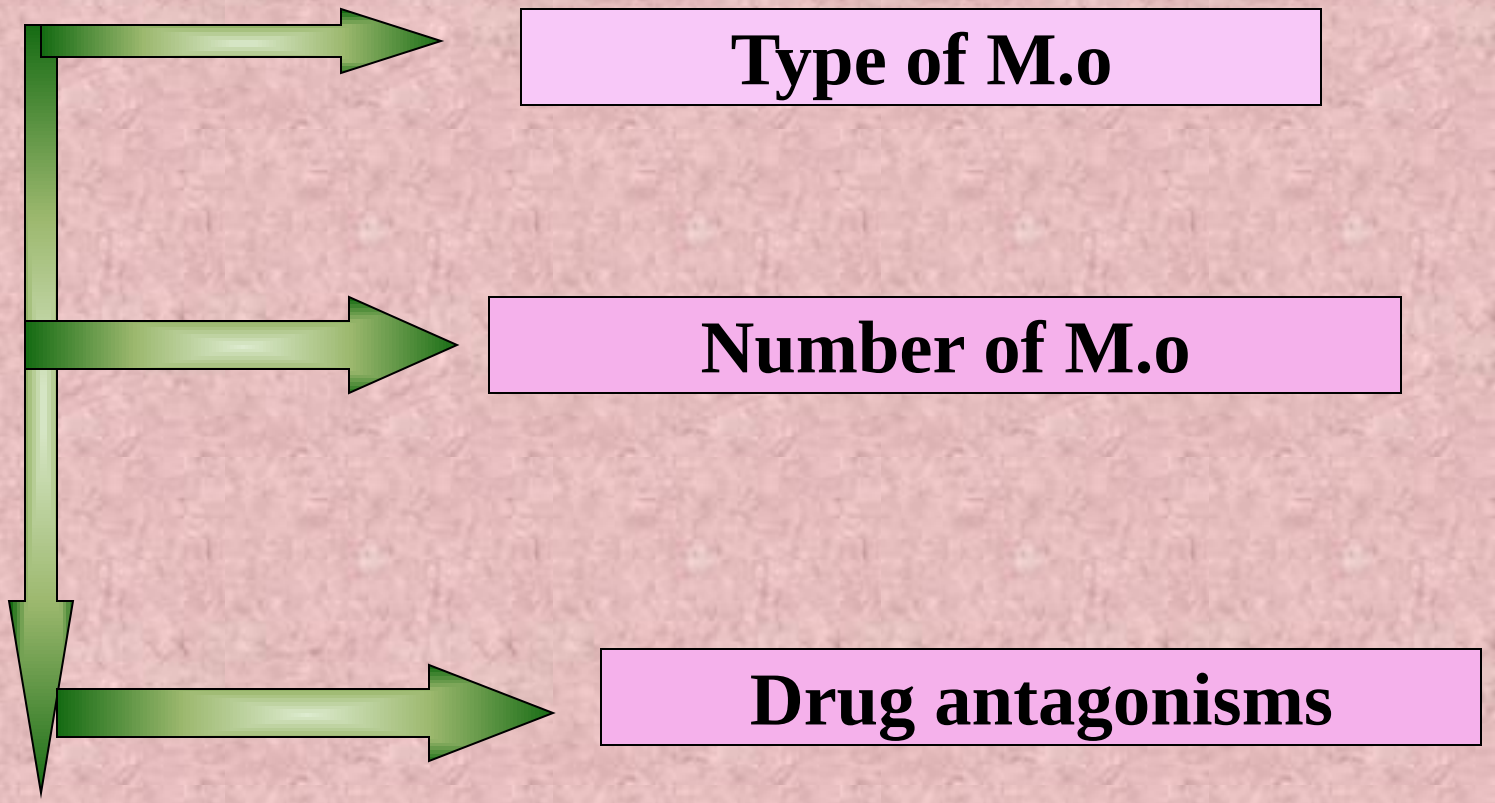
Factors influencing action of antiseptics and disinfectants



a- organic matter has protective effect upon m.os so disinfectants have poor penetrating power.

b-hardness of the water used for making a solution dissolved minerals may inhibit the antimicrobial action of the drug.

c-the pH of media


Type of M.o
Number of M.o
Drug antagonisms

classification:

I-Physical:

1- heat ⟶ boiling, pasteurization, autoclaving , dry heat & moist heat by steam at 115˚c for 30min.

2- light ⟶ ultraviolet rays& sun light

3- bacterial filters ⟶ stiz filter, Berkfeild filter & others efficient for sterilizing sera& liquid.

4- Osmotic agents:

A-Hyper osmotic agents

As Nacl 10% or glucose 10% dehydrate the organisms.

B-Hyposmotic agents

As D.W rupture the bacterial cells

2- chemicals

1-oxidizing, reducing agents

2- halogens

3- metallic compounds

4- Acid & alkalis

5- Alcohol

6- phenols

7- dyes

8- detergents & other organic antiseptics

Common uses

- 1- antiseptics
- 2- disinfectants

1-oxidizing agents

a-peroxides:

nascent O2

$H_2O_2 \xrightarrow{\text{nascent } O_2}$ kill M.O.

- It bubbles in contact with the tissue-

- colorless, odorless , 3% H2o2 retard healing, effective. Short duration of action, stable & effect on spors.

b-pot. Permanganates

1/5000 releasing nascent O2→ has a germicidal power.

- Used as antiseptic & astringent.

Higher conc. are irritants.

- Brown sol. is inactive.

- Staining of the tissue is the main disadv. & it can removed by dilute sol. of oxalic acid.

c-halogens…..e.g….chlorine

Cause oxidation without release of o2 gas.

2-Reducing agents

e.g 1-Formaldhyde:

An irritant gas, has antimicrobial activity as gas or in liquid form. **40 % in water forms formalin which kill most M.O.**

Mode of action: acts by alkylating the amino & sulfhydryl (SH) groups on bacterial cell surface.

Uses: 1-It forms toxoids with bacterial toxins.

2-It is used as urinary antiseptic in acid urine by its liberation from hexamine in acid medium.

3-For fumigation of buildings (formalin and pot. permanganate are mixed 5:3) liberating formaldehyde.(require 6-12 hr. contact time)

N.B. Formaldehyde not affected by organic matter.

Formaldehyde due to its irritating fumes, carcenogenic → limit its use

glutaraldehyde superior to formaldehyde

2- Sulpher dioxide :

it is liberated a gas when sulpher is ignited, use as fumigant for animal houses.

for every $3m^3$ of air 0.5 kg of sulpher should be burned.

3-Heavy metal disinfectants

e.g….Salts of silver and mercury.

Action and mode of action:

They are bacteriostatic acting by reacting with SH group of bacterial enzyme.

Uses:

a-mercury salts:

i-mercuric chloride used as skin antiseptic.

ii-mercuric nitrate and oxide which used as oint. to the eye.

iii-bin iodide of mercury: 1 % in lanoline as blister or counter irritants (1: 8).

iv-organic mercury compounds act as disinfectants by liberating mercury ions as thiomersal for wounds, skin and instruments.

b-Silver salts:

i-silver nitrate …liberate free silver but irritant

c-Copper salts: copper sulphate 1 %, astringent, fungicidal and germicidal.

d-Zinc salts: antiseptics including zinc sulphate, zinc oxide and zinc chloride.

e-Aresnic: They includes…..arsanilic acid and Na arsanilate.

They are used orally as intestinal antiseptic for E.coli .

4-Disinfectant acids and alkalies

a-Nalidixic acid

Drived from naphthyridine , given orally as urinary antiseptics for G –ve bact..

b-Mandelic acid bactericidal in acid media, given orally as urinary antiseptics **as ca salts of methenamine mandelate.**

c-Caustic soda. and quick lime it is used as building disinfectants but the are corrosive.

Washing soda (Na carbonate) ⟶ cleansing & disinfectant after outbreak of FMD

5-Alchols

Ethyl alchol 70 %
isopropyl alcohle 70%

-It is used as skin antiseptic,

- it acts by dehydration and solubilizing the lipid cell mem. & ppt. (denaturation) for protein of bacteria.

-effective on clean skin because organic mater reduce its activity, it need few minuets for optimal activity.

Alcohol is followed by povidone iodine ,chlorohexidine or quaternary ammonium compounds

6-Phenol and its derivatives

a-Phenol:

Uses: 1-used for comparison with other disinfectants.

2-used 2 % as powerful antiseptic but 0.5 % is ineffective.(loss its activity by dilution)

Mode of action: Phenol dissolves the bacterial cell wall lipids and kills the bacteria by combining with their protein.

b-Crysol:

1-Crysol is methylated phenol, less water soluble, more powerful disinfectants.

2-It is used at concentration of 0.5-1 % as intestinal antiseptic.

7-Dyes

a-Rosaniline

It acts as disinfectant by interfering with the glutamic acid metabolism of the M.O.

i-Brilliant green:

1-It is used in 0.05-1 % for killing G+ve bacteria.

2-external use at 0.5 % alcoholic sol.

ii-Crystal violet and methyl violet stains:

used as antiseptic for killing G+ve bacterial except streptococcus in sol……1-2.5 alcholic or 0.5 % watery.

b-Acridine derivatives

Action and mode of action: Acridines act as antiseptic by inhibiting synthetic processes of the M.O. by intercalating with its DNA.

i-Acriflavin:

1-its phenol coefficient is several hundreds
2-not inhibited by the serum.
3-act slowly in low concentrations 0.1% saline externally and 0.01 % internally.

ii-Proflavin hemisulphate:

1-it is active in the presence of pus.

2-it is used at concentration of 0.2 % solutions which is least irritant.

c-Fluoreceine: It is a diagnostic dye for many diseases.

d-Azo dyes (Prontozil): Metabolized to sulphanilamide which act as antiseptic.

e-Methlene blue: It acts as antiseptic by carrying O2 as oxidizing agent.

8-Halogen disinfectants

a-Chlorine:

Chlorine has a phenol coefficient 200 used to sterilize water.

Possess antiseptic and deodorizing properties

Mode of action: Its action is due to formation of hydrochlorous acid which cause sterilization of water.

Hypochlorites release chlorine slowly when exposed to atmosphere or organic material.

They includes:

i-chlorinated lime by releasing Cl.

used for building.

ii-Eusol (chlorinated lime + boric acid) used for wounds

iii-Chloramine T: It act by libarating chlorine oxidizing the bacterial protein, then halogenating the amino group. It is used for irrigating wounds.

iv-dichloramine: similar to choramine T but it is used as ointment.

b-Iodine

An efficient disinfectant but has a counter irritant effect, rapidly inactivated by tissues and other proteins, corrosive to metals, stains skin & clothes. retard healing.

****Iodine preparations:**

i-Tr. iodine: used at concentrations 2.5 % as disinfectant for skin and cat gut.

ii-Lugol's iodine: watery sol. of I. Used at conc. 0.2 % for internal application(intra utrine & vaginal irrigation).

iii-Iodoform: used as skin antiseptic (1:4 in talk powder) as dusting powder.

Iodophors

- iodine is solubilize by surfactants , allows it for slow continual release of free iodine to exert its germicidal effect.

- Has similar spectrum of activity to aqous sol., less irritating, corrosive &staining &have prolonged activity (4-6 hr), active in presence of organic matter.

-common solubilizing carriers include polyvinylpyrrolidone the resulting preparation called povidone-iodine (Betadine) .

Iodophors used as teat dip.

Consideration must be taken

*Iodine has ability to be systemically absorbed through skin & m.m when applied as tr. or as an iodophor.

*The extent of absorption is related to the conc. Used, frequency of admins.& status of renal function.

*complication include ↑ serum enz. levels, renal failure , metabolic acidosis& ↑ serum free iodide.

9-Disinfectant detergents

Those are active in mildly acid sol.

Those are active in alkaline sol.

Anionic

Hard soap

Soft soap

Sodium lauryl sulphate

Cationic

Quaternary amm. Compound.

a-Chlorhexidine (Hibitane):

It is potent bactericide acting by releasing the intracellular materials from the bacteria.

b-Soaps (Hard and soft): used as bactericide to some M.O.

c-Cetrimide (cetavlon):

It is used to clean the skin removing normal fat. Used as solution (0.1-0.5 %).

d-Benzalkonium chloride (Zephiran):

It is used at concentration 0.01-0.1 % alcoholic sol.

Has strong antibacterial properties.

10-Other organic antiseptics:

a-Nitrofurans:

Antibacterial action by inhibiting enzymes as pyruvic oxidase and aldehyde dehydrogenase,
depriving the bacteria of energy essential for its growth.
given locally or systemically.

i-Furazolidone: acts on salmonella, shigella and Eimeria species .

ii-Nitrofurazone: bactericidal for G+ve and G-ve and Eimeria .

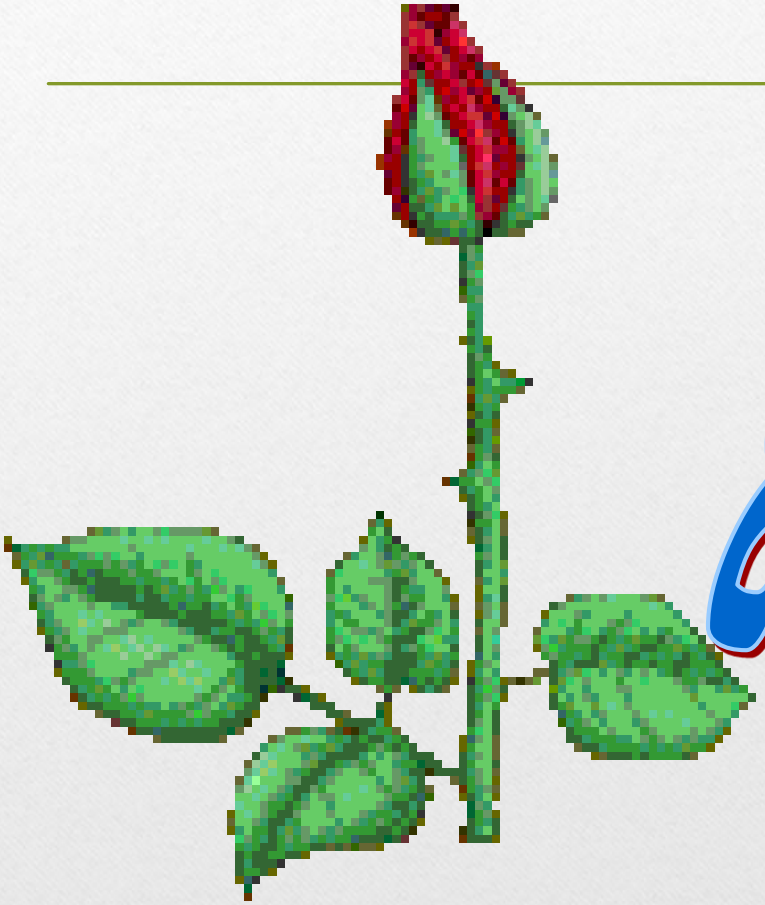
It is used as bacteriostatic at 1-200,000 dilution.

****Nitrofurans are used as urinary antiseptic affecting M.O. resistant to sulphonamides.**

b-Propamidine isoethionate (Brolene)

Uses: 1-As antiseptic for open wounds and burns as jelly or cream.

2-As therapy for babesiasis



الحمد لله

أولا وآخراً

PRESCRIPTION WRITING

****

The prescription is a written order from the physician or veterinarian to the pharmacist to prepare a certain for of a drug in certain amount and instruction to the owner of animal to dose and route of administration. The prescription should contain name of practitioner and address. Also patient age, sex and owner's name over the superscription.

Compartments of the prescription:

It is arranged as follows:

I-Superscription R/

This symbol is the abbreviation of the Latin word recipe = take. In French prescription R/ is replaced with P which is the abbreviation of prenez = take.

II-Inscription 1-basic drug 2-adjuvent 3-corrective 4-vehicle

III-Subscription ft.

IV-Signature or sig.

Signature of practitioner

Dr……
Qualifications…..
Regist. No……
Tel. No……..
Address…….
Clinic hour….
Patient animal species….
Animal's owner name and address….
Date……
R/
Basic
Adjuvant
Corrective
Vehicle

Subscription
Signature

Signature

Abbreviation used in prescription writing

Latin abbreviation	English meaning
Q.S.	Sufficient quantity
Ad	Add up to
s.s or ss	A half
Aa or àà	Of each

S. or sig	Write on the label
Ft	Make in the form of
M	Mix
Mitte	Send
Div.	Divide into
Pulv.	Powder
Pil.	Pill
Elect.	Electuary
Bol.	Ball
Tr. Or Tinct.	Tincture
Collyr.	Eye lotion
Emul.	Emulsion
Lin.	Liniment
M or mist.	Mixture
Ung.	Ointment
P.C.	After meals
A.C.	Before meals
i.d.	Daily
B.i.d.	Twice daily
T.i.d.	Three times daily

Writting prescriptions for patent préparations

1-patent prescriptions must be written in the same way and composed of the same parts of the prescription
2-instead of the names of the drugs and their amounts in the inscription, the trade name of the preparation is to be written followed by the name of the drug-house producing it if possible (between t brackets)
3-in the subscription, the amount required is to be written
4-example

Writting prescription for narcotic drugs

The narcotic prescriptions must be written under strict regulations and the pharmacist will dispense the prescription when the following are present:-
1-the address of the owner of the animal must be written
2-the prescription must be written with ink, signed and dated
3-the amounts of narcotic drugs must be written in number and words
4-"For animal use only" must be written

5-the pharmacist must retain and file the prescription
6-the dispensing of the prescription must not exceed more than 5 days from its date
7-the narcotic drug quantities must not exceed the amount in the list in the table of "Dangerous Drug Act" e.g…opium 0.5 gm…morphine and its salts 0.06 gm….heroin 0.02 gm….pethidine 0.65 gm
8-permission from the department of narcotics, ministry of public health must be obtained if necessary to prescribe more than listed amount in one prescription

Policy in writing prescriptions

Incompatibility means the counteraction of 2 drugs in one prescription

Types of incompatibility

1-physical type: when there is physical change in one or more of drugs in one prescription e.g…fixed oil and water solutions as they are immiscible. This problem can be overcome by adding an emulsifying agent

2-chemical type: occur when there is interaction between 2 soluble salts leading to formation of another salt. It may be either intentional or unintentional.

a-intentional type…..means intended to write 2 chemical compounds in one prescription, which react together to form the needed compound in a nascent form as zinc sulfate and lead acetate in white lotion to form lead sulfate which is the desired compound

b-unintentional type….it happens when combination of the prescribed ingredients leads to formation of undesired, harmful or dangerous compounds and should be avoided in prescriptions, e.g…alkaloidal salts are incompatible with alkalis, tannic acid is incompatible with iron preparations

3-pharmacological type: this occurs when there is antagonism between 2 drugs in their pharmacological actions, e.g….magnesium sulfate and tannic acid, also caffeine and bromides.