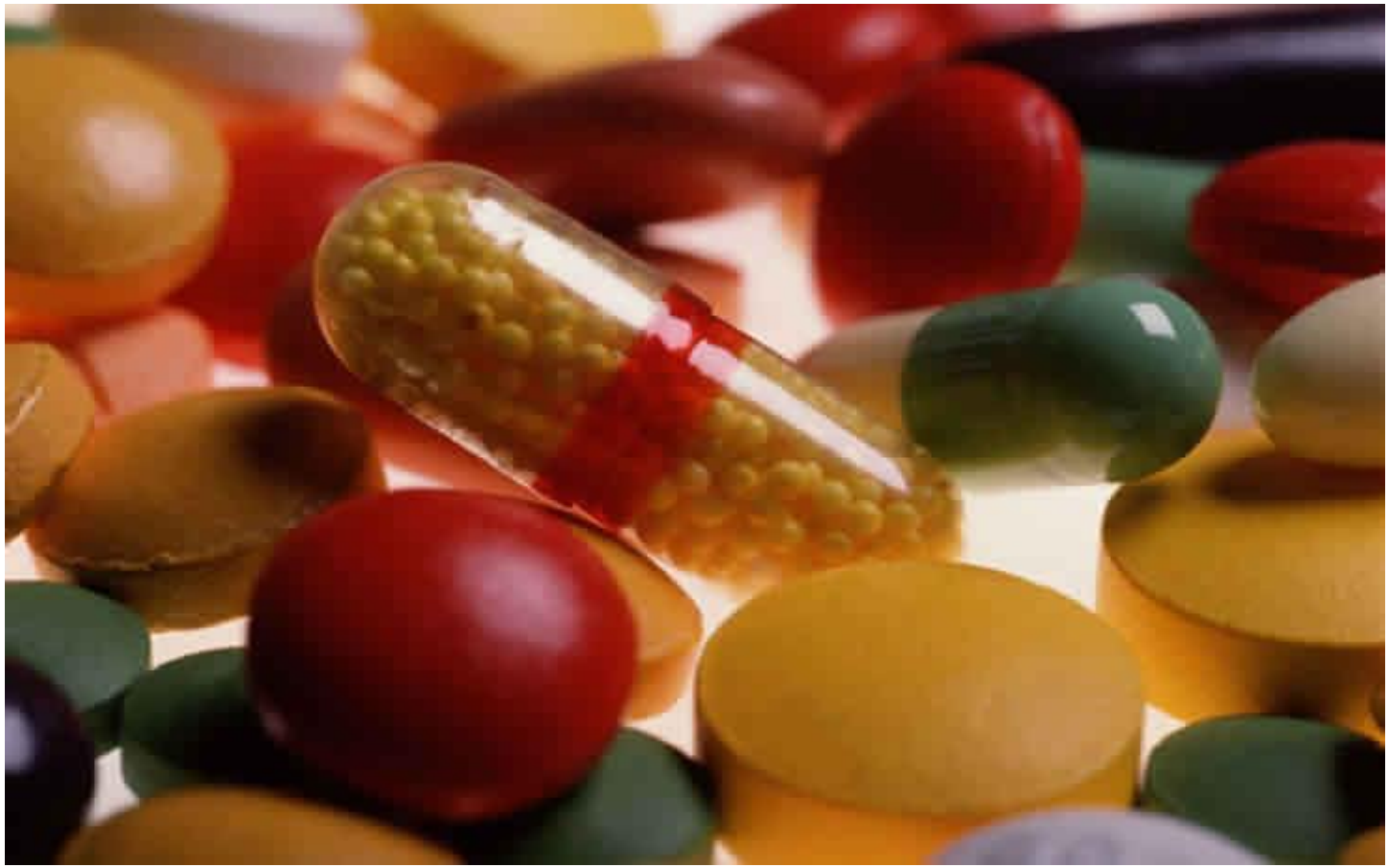
Principles of Anti-microbial Therapy



Antimicrobial drugs

An antimicrobial drugs are any substance of natural, semisynthetic, or synthetic origin either to **kills** or **inhibits** the growth of a microorganism, BUT causes little or no host damage……

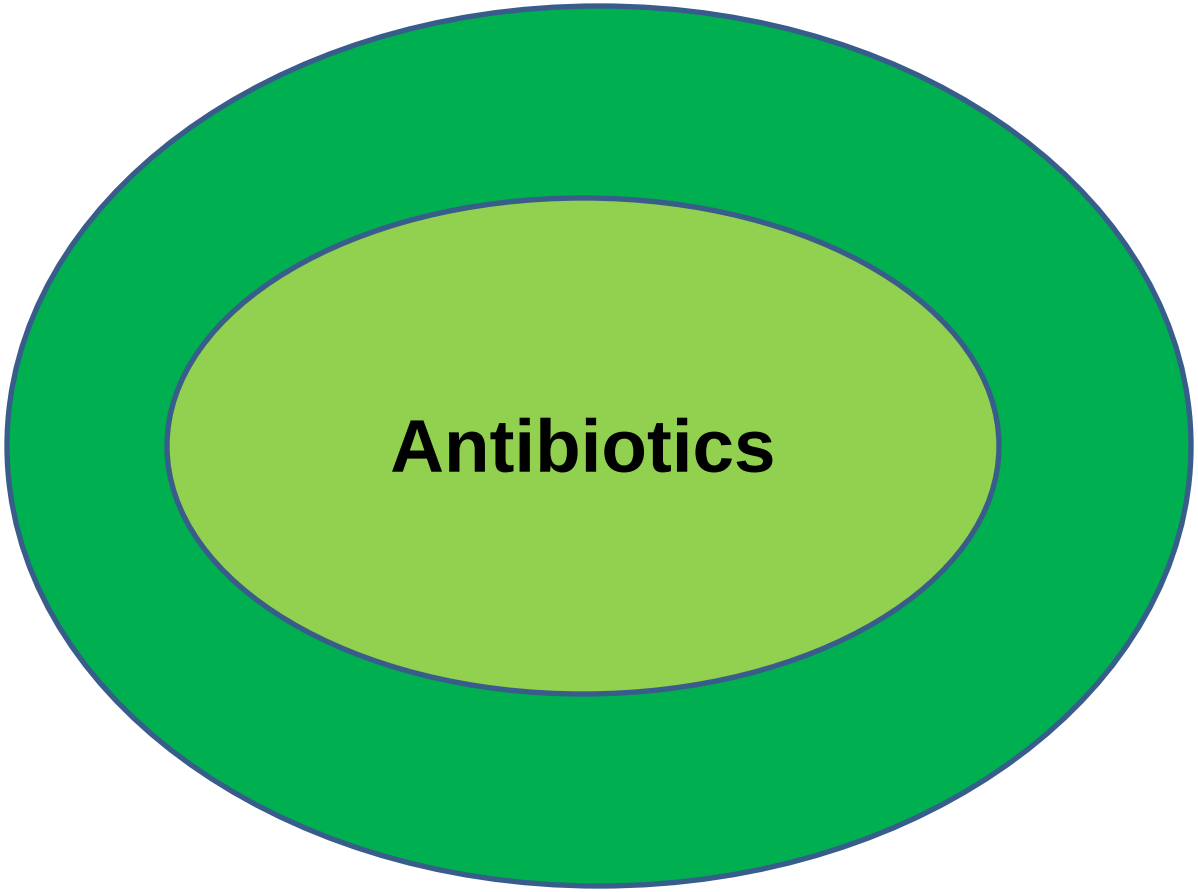
Ex:
(Quinolones, Sulfonamides)

Antibiotics (ATB)

- Substances produced from certain of microorganisms (M.O) either bacteria or fungi to act against other M.O.

- To suppress (inhibit) the growth of M.O or to destroy (kill) them.

  Ex:- (penicillins, tetracyclines)


Antibiotics

- The most imp thing that these drugs should do no harm to the host cell.
  - (Highly selectivity drugs against M.O rather than human cells)
- From where did this selectivity of these drugs come????

Differences between bacteria & human cells

Bacterial cells	**Mammalian cells**
Cell wall	No cell wall
Small Ribosome (70s)	Large Ribosome (80s)
Folic acid come from :- Conversion of Para AminoBenzoic Acid (**PABA**) to folate	Folic acid come from Dietary folate

- the selective toxicity is relative rather than absolute, requiring that the concentration of the drug be carefully controlled to attack the M.O while still being tolerated by the host

Classification of antimicrobial agents

1. According to the **CAUSTIVE AGENTS (The type of organism) against which they are active.**

(bacteria, virus, fungi) `either (antibacterial, antiviral, antifungal & so on)

2. According to their structure (Macrolides, Aminoglycosides, Tetracyclines)

3. According to their mechanism of action:

a. Inhibition of cell wall synthesis
(e.g. Penicillins, Cephalosporins).

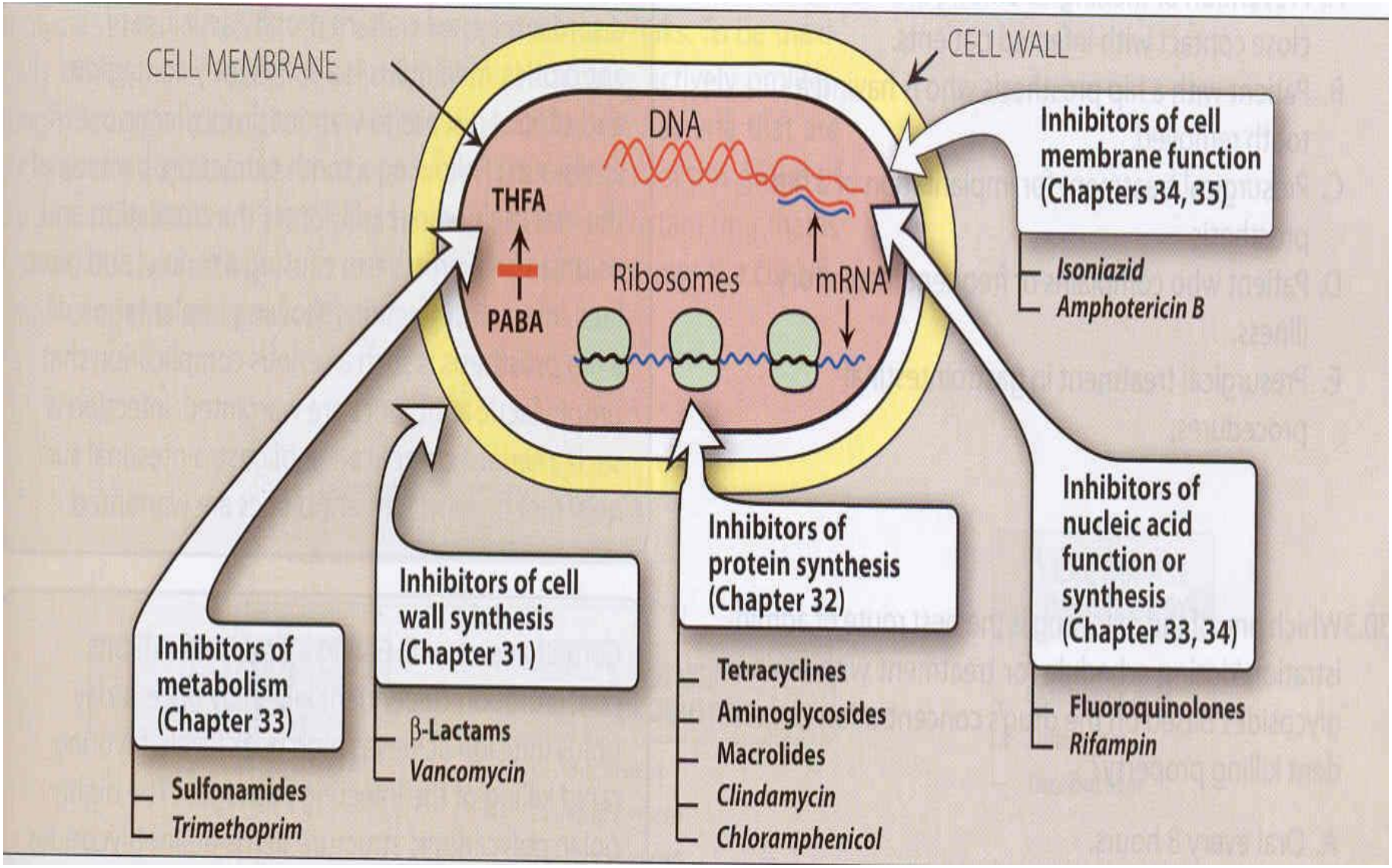
b. Inhibition of protein synthesis
(e.g. Tetracyclines, Macrolides).

c. Inhibition of nucleic acid synthesis or function
(e.g. Fluoroquinolones)

d. Inhibition of metabolism
(e.g. Sulfonamides)

e. Inhibition of cell membrane function
(e.g. Isoniazid)

Classification of some antimicrobial agent by their site of action..



4- According to the Spectrum of activity

Spectrum: the range of bacteria that a drug is effective against.

1. **Narrow spectrum** antibiotic: active against single or limited # of M.O. (ex Isoniazid)

2. **Extended spectrum :** is one that, as a result of chemical modification, affects additional types of bacteria, usually those that are gram-negative. active against types of bacteria G- & G+.

   (ex Ampicillin)

3. **Broad spectrum:** active against a wide variety of microbial species.

(ex Tetracyclines, quinolones, clindamycin , Chloramphenicol).

- Using narrow spectrum effective drug clinically is much better than using abroad spectrum.

So, if u know the causative M.O & u know their susceptibility to the drugs it's better to choose the narrowest drug.

Why???

- Coz wider spectrum means the drug will affect other M.O ex. Normal flora in respiratory tract, urinary tract and so on and we will get condition called ***superinfection*** which is one of complications of using broad spectrum.

5- By their action

1. Bacteriostatic drugs

- They **arrest/inhibit** (**stops does not kill it)** the growth & replication of the bacteria.
- **Given to pts who have good immunity.**

E.x.

Sulphonamides,

Trimethoprim, Tetracyclines, macrolides, Clindamycin,

Chloramphenicol.

2. Bactericidal drugs

-kills the bacteria that are rapidly dividing or multiplying.

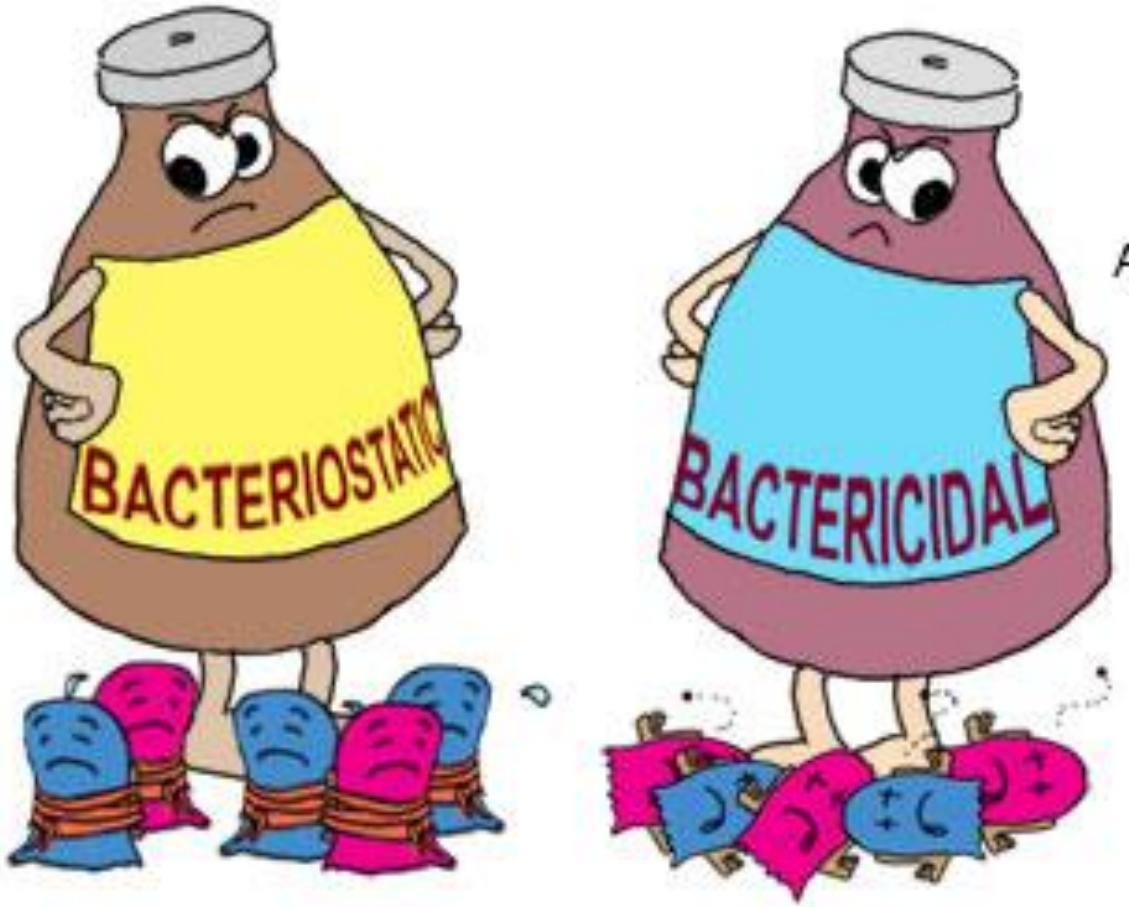
-more preferable in pts who have low immunity. .(HIV patients, cancer patients, taking steroids)

E.x.

Vancomycin ,B-lactams, Aminoglycosides, Rifampicin

Sometimes (not a rule) when you combine two of these bacteriostatic in one drugs, the new drug will become bactericidal.

EXAMPLES:
Chloramphenicol
Erythromycin
Clindamycin
Sulfonamides
Trimethoprim
Tetracyclines



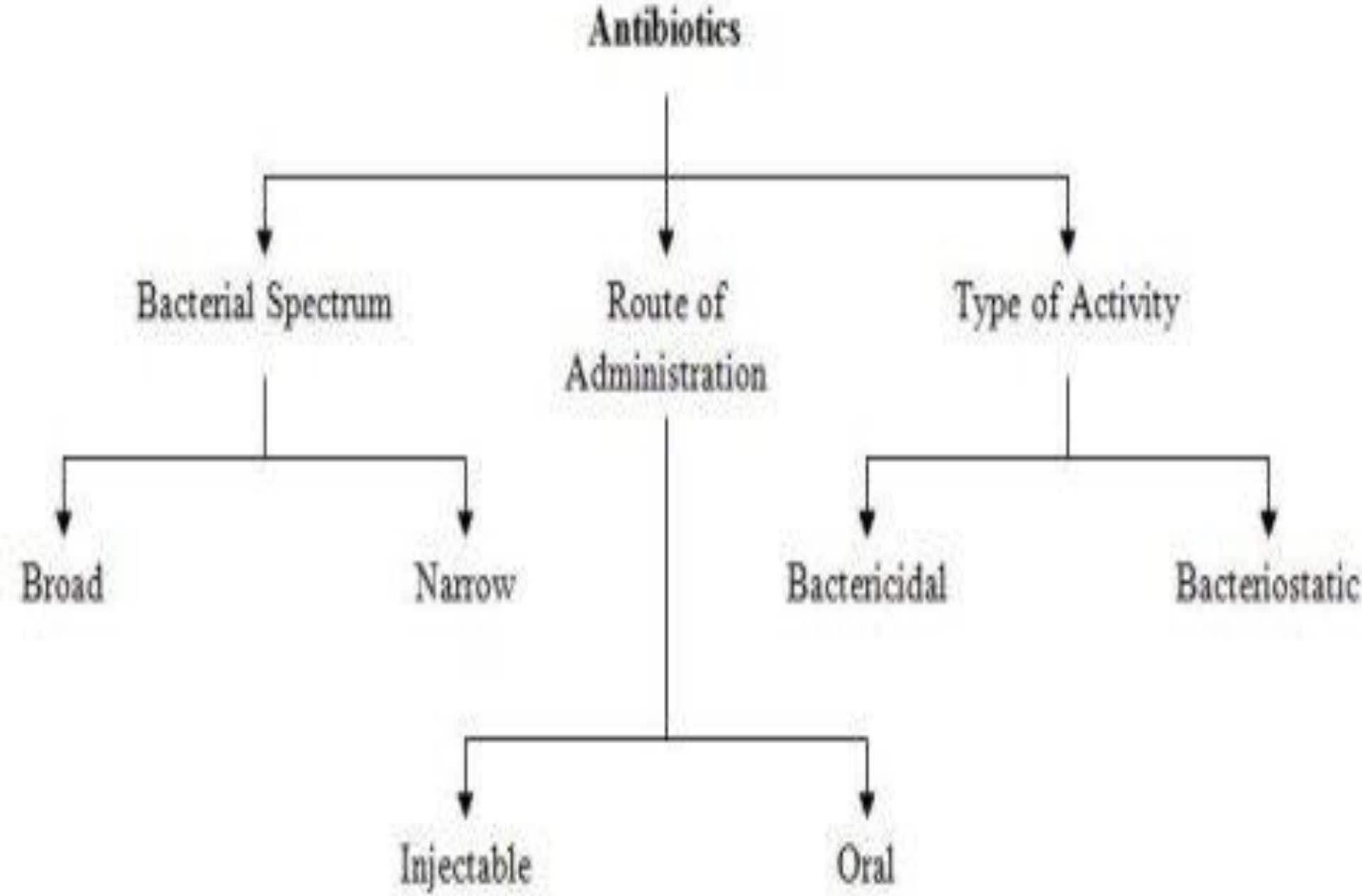
EXAMPLES:
Aminoglycosides
Beta-lactams
Vancomycin
Quinolones
Rifampin
Metronidazole

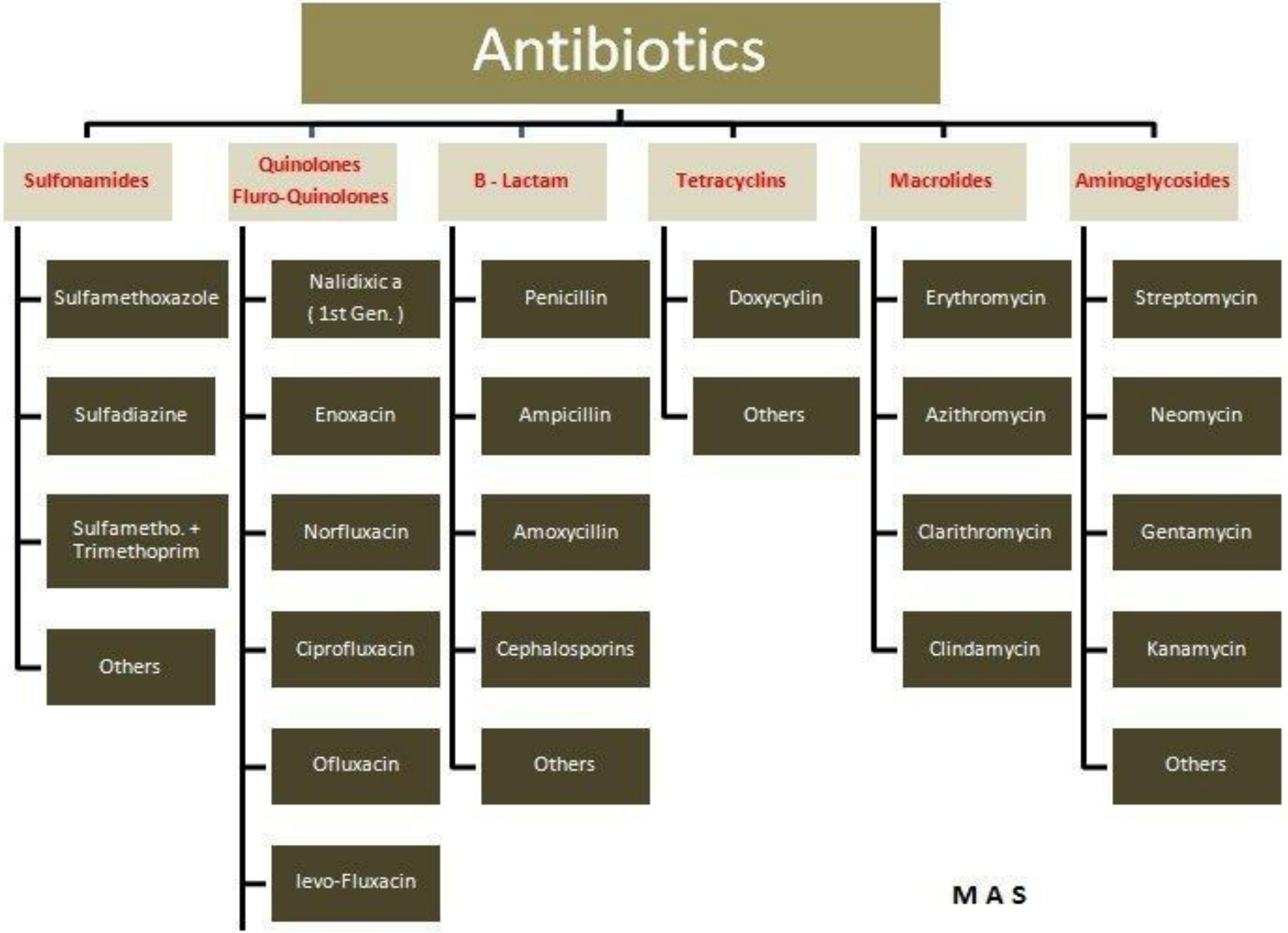
Factor determine statics or cidal

1.The mechanism of action of the drug. For example, inhibition of cell wall synthesis in the bacteria is most likely to be bactericidal agents.

2. The dose (serum level) of the drug at the site of action.

3.The type of microorganism (sensitivity);if the microorganism is resistant to the drug it will be affected like the drug is bacteriostatic even if it's bactericidal.


Antibiotics
Bacterial Spectrum
Route of Administration
Type of Activity
Broad
Narrow
Bactericidal
Bacteriostatic
Injectable
Oral


Antibiotics
Sulfonamides
Sulfamethoxazole
Sulfadiazine
Sulfametho. + Trimethoprim
Others
Quinolones Fluro-Quinolones
Nalidixic a (1st Gen.)
Enoxacin
Norfluxacin
Ciprofluxacin
Ofluxacin
levo-Fluxacin
B - Lactam
Penicillin
Ampicillin
Amoxycillin
Cephalosporins
Others
Tetracyclins
Doxycyclin
Others
Macrolides
Erythromycin
Azithromycin
Clarithromycin
Clindamycin
Aminoglycosides
Streptomycin
Neomycin
Gentamycin
Kanamycin
Others
M A S

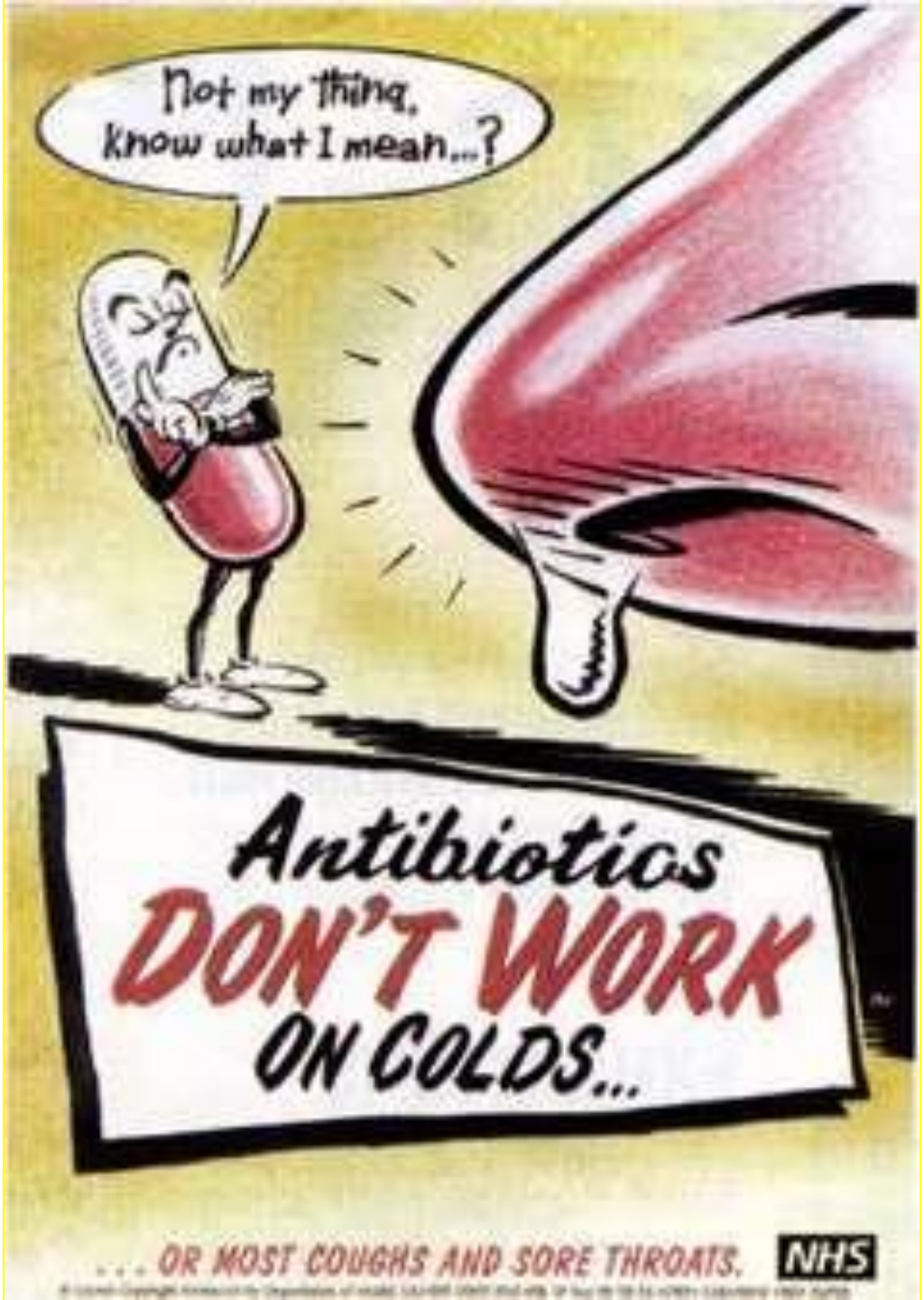
Selection of Antimicrobial Agents

1- Making the diagnosis :

- ✓ To be sure that the pts is suffering from an bacterial infection.
- ✓ Know the site of infection(GI,RT,UT).
- ✓ Identify the organism.
- ✓ Take the required specimen from the patient.(blood , CSF, mid stream urine ,ear swap, vaginal discharge)

2-Remove the pathological barrier to cure

(abscess ,obstruction)


Not my thing, know what I mean...?
Antibiotics
DON'T WORK
ON COLDS...
...OR MOST COUGHS AND SORE THROATS.
NHS

3-Select the best drug : So that it reach site of infection in the therapeutic conc.

- Drug properties: PK,TI.
- **Optimum dose & frequency**
- **the most appropriate route of administration**

4- The cost of therapy.

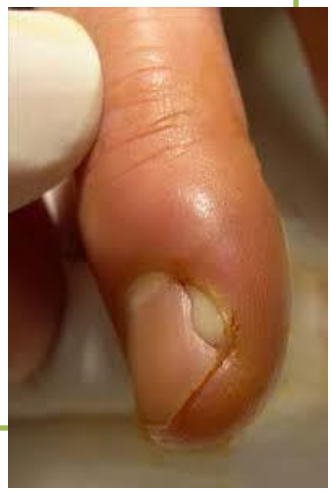
5-Patient factors:

1. Immune system.
2. Renal dysfunction.
3. Hepatic dysfunction.
4. Poor perfusion.
5. Age.
6. Pregnancy.
7. Lactation.
8. Concomitant medication.
9. Allergy.

Antibiotic Therapy

The principle in any infection the first thing you should do is that you should take a sample for culture & sensitivity test to identify the causative organism and treatment.

Test :- (Blood ,sputum,urine,pus,etc..)



- The first step is culture and sensitivity but while waiting for the culture and sensitivity test to come back that **minimally takes 48 hrs** unless there is a weekend ,we can't keep the pt without treatment for 4 days ,we treat him with what we call **empiric therapy**….

- After lab result if the organisms were similar to what u have diagnosed u continue with ur treatment..

❑**Empiric therapy:** is treating the pt without knowing the causative organisms & their sensitivity test.

- given BEFORE the lab results.

❑**Definitive therapy :**

treating exactly the causative agent depending on its sensitivity test (done after receiving the results of test)

❑**Prophylactic therapy:**

Used drugs to prevent an infection rather than to treat , to maintain health and prevent the spread of disease.

Before and after exposure to a disease entity.

Prophylactic antibiotics (chemoprophylaxis)

1. To prevention of opportunistic infection
   - ❖ In bowel surgery to prevent peritonitis
   - ❖ In dental manipulation to prevent bacterial endocarditis .

2. Prevention of spread among contacts.

- ❖ **Rifampicin to prevent Meningitis.**
- ❖ **Chloroquine to prevent Malaria.**

5- To prevent infection or disease :

- To prevent recurrent **UTI: Co-Trimoxazole** twice per week

- to prevent **Rheumatic fever :** young man who is having recurrent **tonsillitis**, we start giving him a monthly interval long acting **Benzathine penicillin** to prevent the acute streptococcal infection from coming back.

- **To prevent hepatic coma -- Neomycin**

1

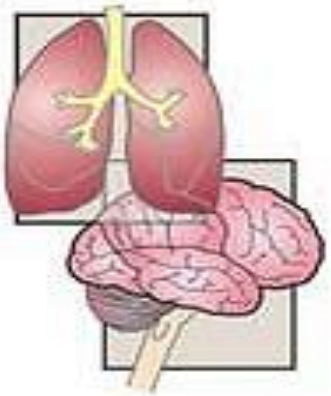
Prevention of streptococcal infections in patients with a history of rheumatic heart disease. Patients may require years of treatment.

2

Pretreatment of patients undergoing dental extractions who have implanted prosthetic devices, such as artificial heart valves, to prevent seeding of the prosthesis.

3

Prevention of tuberculosis or meningitis among individuals who are in close contact with infected patients.



4

Treatment prior to certain surgical procedures (such as bowel surgery, joint replacement, and some gynecologic interventions) to prevent infection.

5

Treatment of the mother with *zidovudine* to protect the fetus in the case of an HIV-infected, pregnant woman.

Combination of antimicrobials

Advantages

1. To delay or avoid the development of resistance.

   (Ex. Tuberculosis)

2. To broaden the spectrum of activity. (Mixed infection,severe unknown infection,).

3. To obtain potentiation (synergistic effect).

- B-lactams and aminoglycosides in endocarditis.
- Co-trimoxazole.

- The antibacterial effects of all the B-lactam antibiotics are synergistic with the aminoglycosides.
- Because B- lactam facilitate the entry of aminoglycosides (inhibit protein synthesis) to gain access to intracellular target sites.

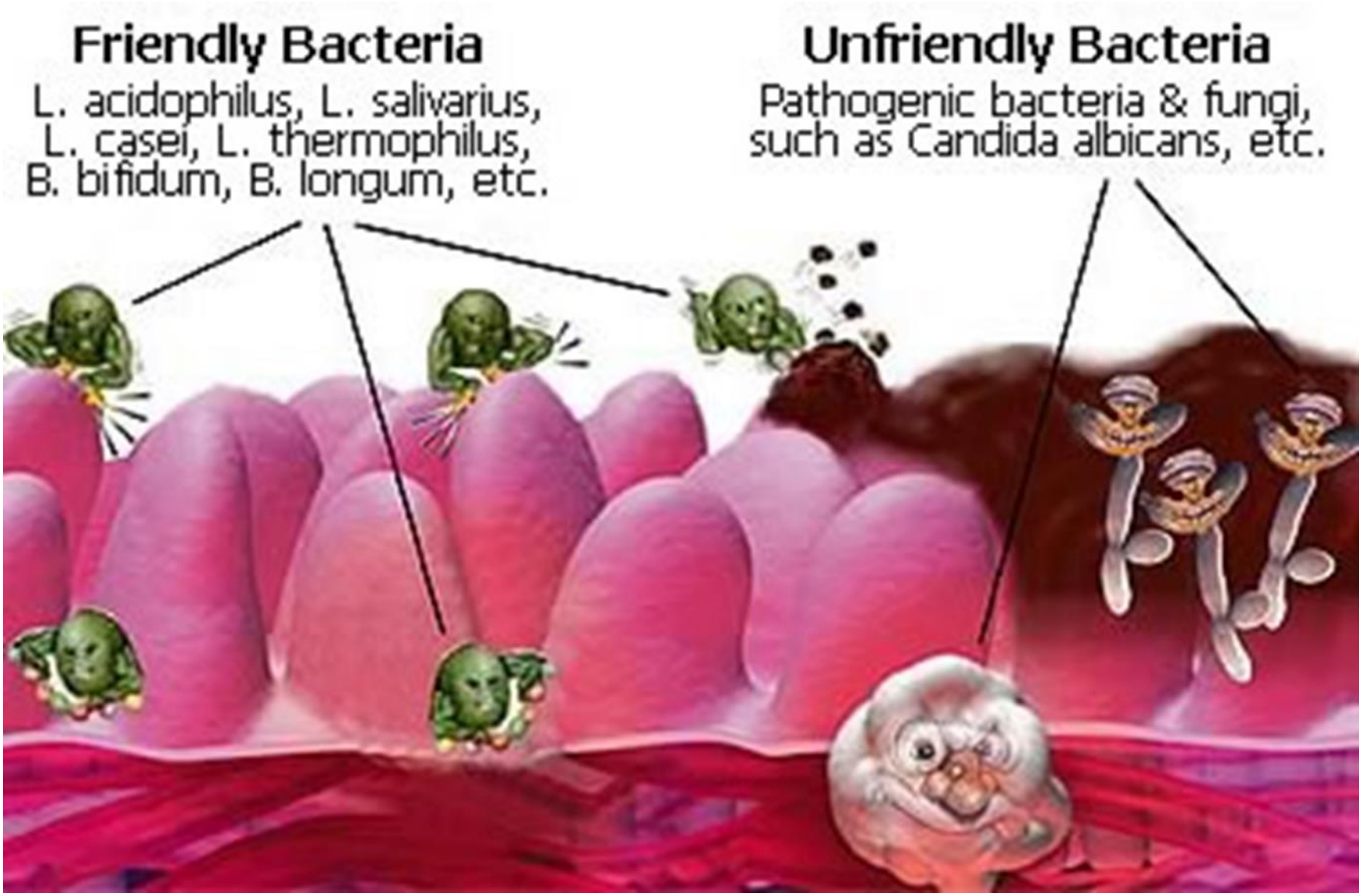
→ This can result in enhanced antimicrobial activity.

- these drug types **should never be placed in the same infusion fluid,** because on prolonged contact, the positively charged aminoglycosides form an inactive complex with the negatively charged penicillins.

Disadvantages:

1. Concomitant administration of a second agent is usually bacteriostatic and may interfere with the action of the first drug that is bactericidal

2. Suppression of normal flora, so give higher chance for opportunistic infection (**superinfection**).
3. Increased incidence of adverse reactions.
4. Highly cost


Friendly Bacteria
L. acidophilus, L. salivarius,
L. casei, L. thermophilus,
B. bifidum, B. longum, etc.
Unfriendly Bacteria
Pathogenic bacteria & fungi,
such as Candida albicans, etc.

Problems with antimicrobial agents

1. Drug resistance.
2. Adverse effects
3. Drug-drug interaction

2. Adverse effects

a. Hypersensitivity; (not dose related)

e.g. Penicillin, cephalosporin.

b. Toxic effect (dose related)

High serum levels of certain antibiotics may cause Direct toxicity / Organ toxicity

e.g. Aminoglycosides(ototoxicity)

- Chloramphenicol (Aplastic anemia)

c. Superinfections: (clostridium difficile-colitis)

alterations of the growth of normal flora of intestine, genitourinary tracts.

Appearance of **a new infection** while treating an original infection (multiply C.difficile).

Classification of Antimicrobial Agents

1) Inhibitors of cell wall synthesis

   - B-lactams - Vancomycin

2) Inhibitors of Protein Synthesis

   - Tetracycline – Aminoglycosides - Macrolides- Clindamycin - Chloramphenicol.

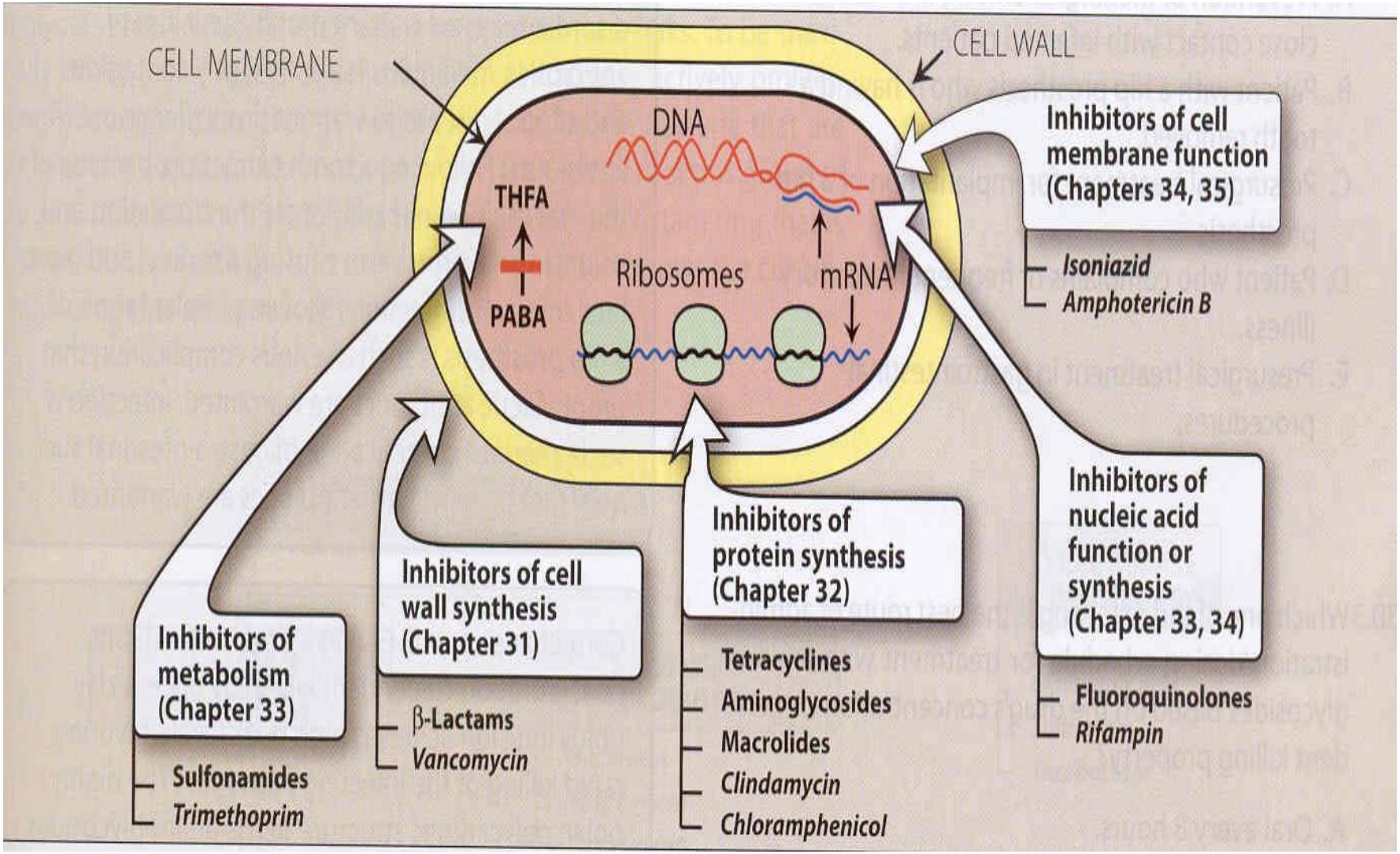
3) Inhibitors of Metabolism

   - Sulfonamides- Trimethoprim

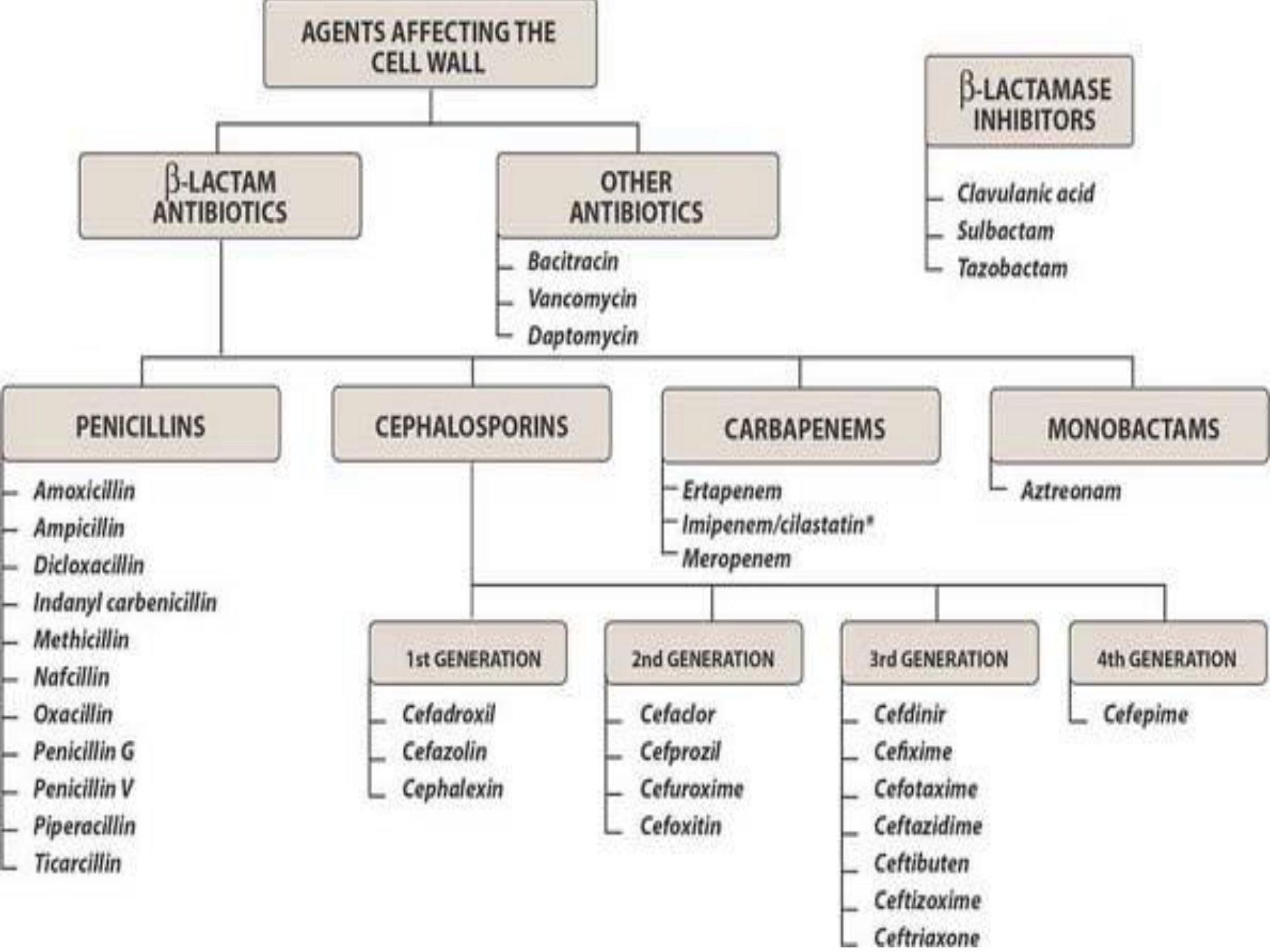
4) Inhibitors of Nucleic Acid function or synthesis

   - Fluoroquinolones- Rifampin

Classification of some antimicrobial agent by their site of action..



A. Inhibitors of Cell Wall Synthesis


AGENTS AFFECTING THE CELL WALL
β-LACTAM ANTIBIOTICS
OTHER ANTIBIOTICS
Bacitracin
Vancomycin
Daptomycin
β-LACTAMASE INHIBITORS
Clavulanic acid
Sulbactam
Tazobactam
PENICILLINS
Amoxicillin
Ampicillin
Dicloxacillin
Indanyl carbenicillin
Methicillin
Nafcillin
Oxacillin
Penicillin G
Penicillin V
Piperacillin
Ticarcillin
CEPHALOSPORINS
1st GENERATION
Cefadroxil
Cefazolin
Cephalexin
2nd GENERATION
Cefaclor
Cefprozil
Cefuroxime
Cefoxitin
3rd GENERATION
Cefdinir
Cefixime
Cefotaxime
Ceftazidime
Ceftibuten
Ceftizoxime
Ceftriaxone
4th GENERATION
Cefepime
CARBAPENEMS
Ertapenem
Imipenem/cilastatin*
Meropenem
MONOBACTAMS
Aztreonam

CELL WALL SYNTHESIS INHIBITORS

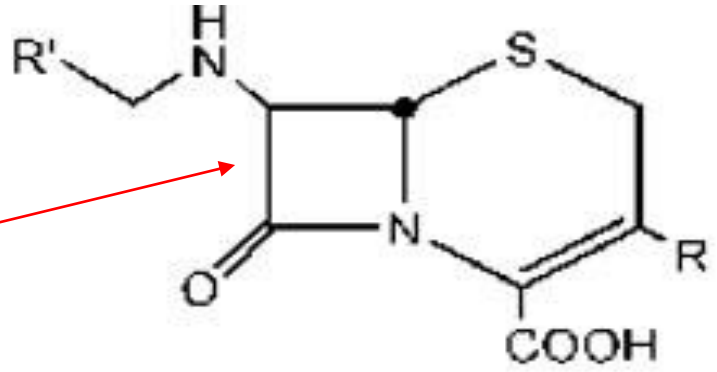
1. β-LACTAM ANTIBIOTICS.
    I. Penicillins.
    II. Cephalosporins.
    III. Carbapenems.
    IV. Monobactams.

All these have one thing in common which is the B-lactam ring, which is very essential & imp for the activity of the drug against M.O.

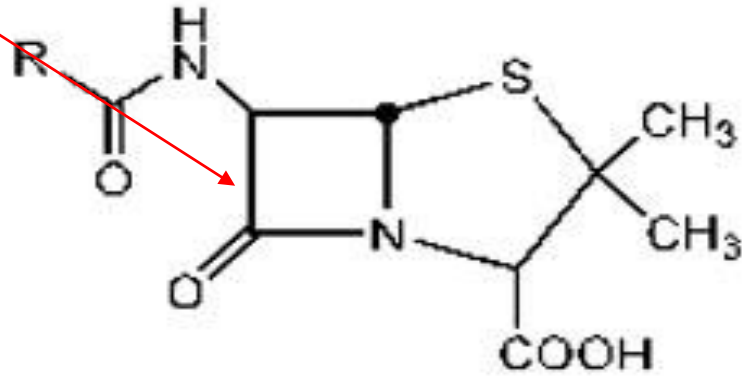
2. OTHER ANTIBIOTICS.
    I. Vancomycin.

1- Beta-Lactam Antibiotics

β-lactam ring



Cephalosporin

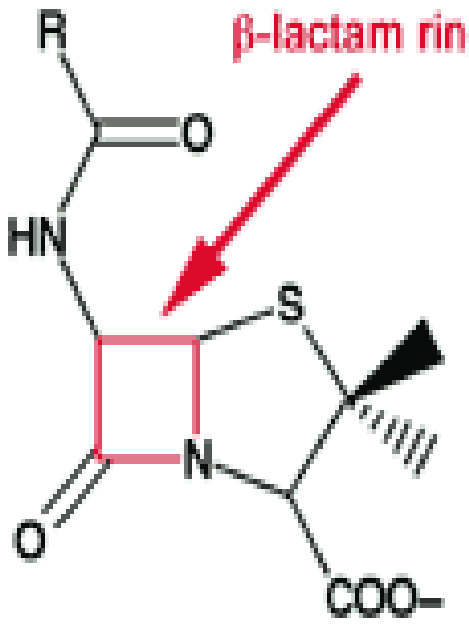


Penicillin

Penicillinases (Beta-lactamases)

enzymes that cleave the beta-lactam ring and thereby render penicillin and other beta-lactam antibiotics inactive against M.O.

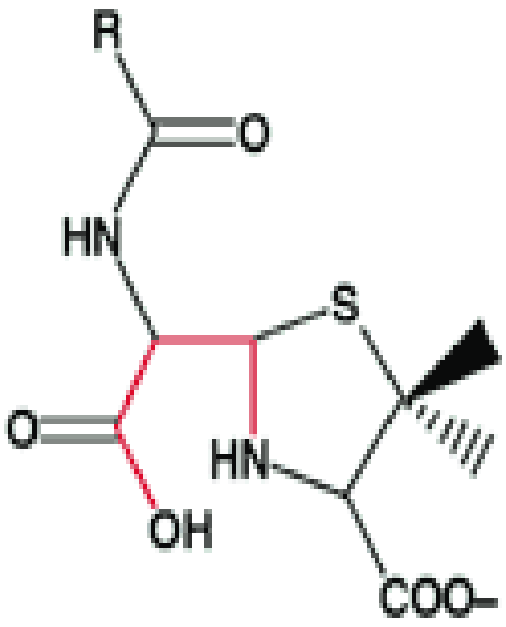
Penicillin Resistance



Penicillin

β–lactamase

β-lactamase breaks a bond in the β-lactam ring of penicillin to disable the molecule. Bacteria with this enzyme can resist the effects of penicillin and other β-lactam antibiotics.



Penicilloic acid

Inactive penicillin

B-lactamase inhibitors

Substance don’t have antibacterial activity but they have the ability to **inhibit** the B-lactamase enzyme….

Ex. Clavulanic acid

Beta-Lactam Antibiotics

- Cell wall active agents
  - Prevent the final step in the synthesis of the bacterial cell wall.
- Range from very narrow spectrum to very broad spectrum
- **Only active on actively multiplying M.O. why???**
- The β-lactams are BACTERICIDAL…WHY????

KEVIN BROWN

PENICILLIN MAN

ALEXANDER FLEMING AND THE ANTIBIOTIC REVOLUTION

I. Penicillins

- ✓The most widely effective and use.
- ✓Least toxic drugs.
- ✓The safest drugs.

  (we exclude the allergy rxn)
- ✓All penicillins are excreted by the kidneys.

Classification of penicillin

1- Natural Penicillins

Penicillin G(parenteral)
Penicillin V(oral)

2- The extended or broad Spectrum Penicillins

Aminopenicillins :
- Ampicillin
- Amoxicillin

3- Anti-pseudomonal Penicillins

Piperacillin

4- Penicillinase Resistant Penicillins (anti-staphylococcal)

Cloxacillin.

Natural Penicillins

AND

The extended or broad Spectrum Penicillins

ARE susceptible to inactivation by B-lactamases (penicillinases)

1. Natural Penicillins

1- Penicillin G (Benzylpenicillin)

-also called Crystalline penicillin.

-it is powder form.

-can be given IV (bolus or infusion) or IM.

- Has very short duration (1-2 hrs).

- Destroyed by gastric juice if it is given orally so, **NOT** given orally.

-Given in sever infection.

Syphilis , acute Tonsillitis.

2- Penicillin V (Phenoxymethylpenicillin)

- Given orally (every 4h).

- Penicillin V is more acid-stable than penicillin G.

- **acute Tonsillitis.**
- Mild to moderate infections.
- Commonly used in children.

Derivatives of penicillin G

Long-acting forms:-

1- Procaine penicillin G (12 hrs) is given as every 12.

2- benzathine penicillin G (4 weeks) is given every month.

- Effective in treatment in syphilis.
- Prophylaxis of endocarditis.
- Prophylactic in rheumatic fever

- Both are administered **IM** and serve as depot forms..
- they are **suspension** formulation that is **never given by IV** rout.


Pro-Pen-G® Injection
(Penicillin G Procaine Injectable Suspension)
Aqueous Suspension
Antibiotic
300,000 units per mL
For Intramuscular Use Only
Sterile, Multiple Dose Vial
Restricted Drug (California)–Use Only as Directed
NADA 65-585, Approved by FDA
Net Contents: 100 mL
Manufactured by
Bimeda, Inc.
Irwindale, CA 91706
Bimeda

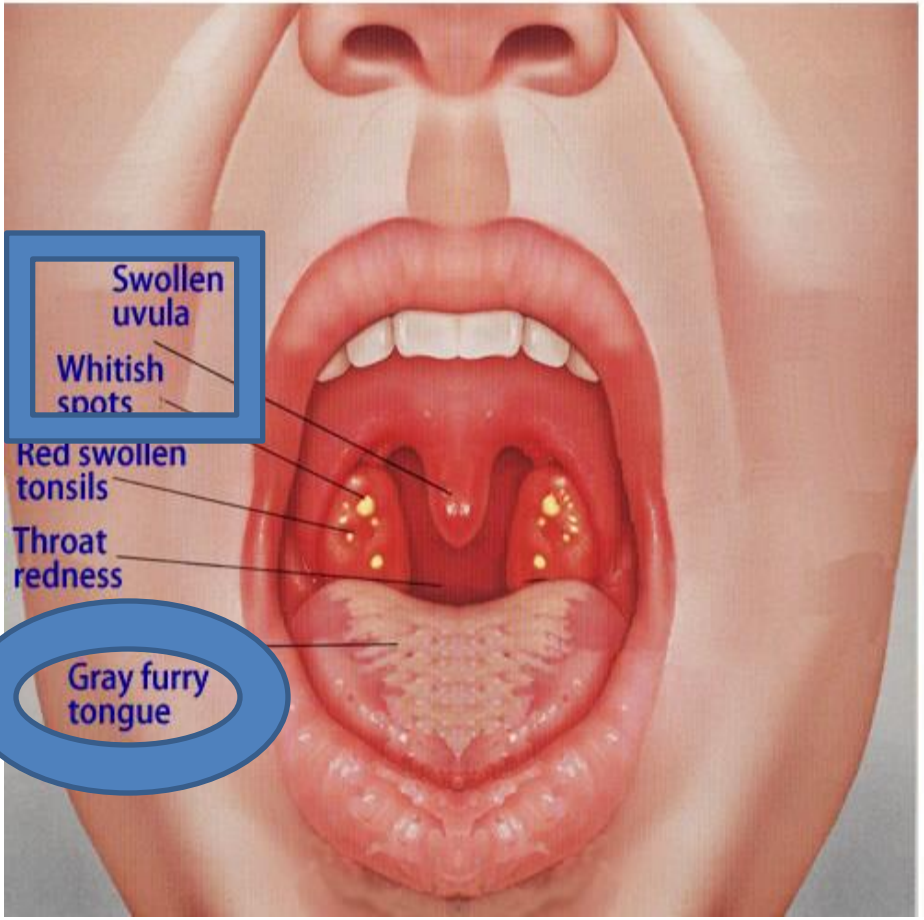

NDC 61570-148-10
Bicillin® L-A
(penicillin G benzathine
injectable suspension)
FOR DEEP IM INJECTION ONLY
2,400,000 units per 4 mL
Ten sterile single-dose disposable syringes
(4 mL size)
WARNING: NOT FOR INTRAVENOUS USE
℞ only
Monarch
Pharmaceuticals®
BICILLIN® L-A
2,400,000 UNITS per 4 mL
FOR DEEP IM USE ONLY
© 2004 GSM

Syphilis & acute sever tonsillitis :

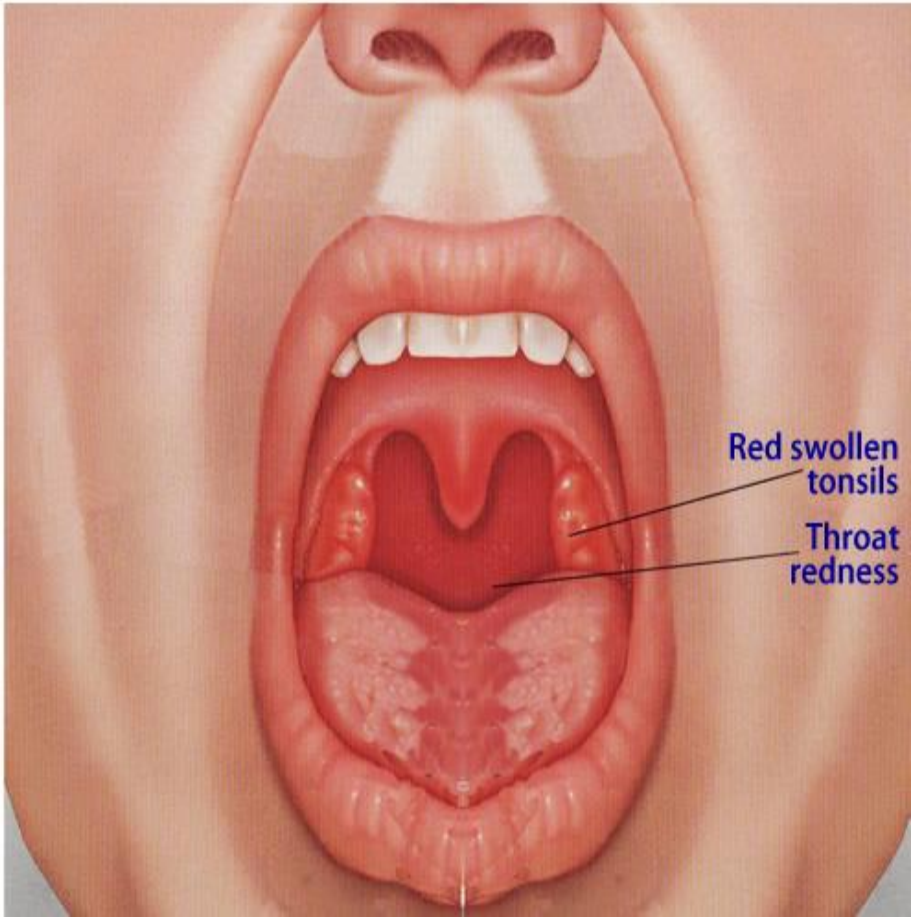
Pen G at the beginning…

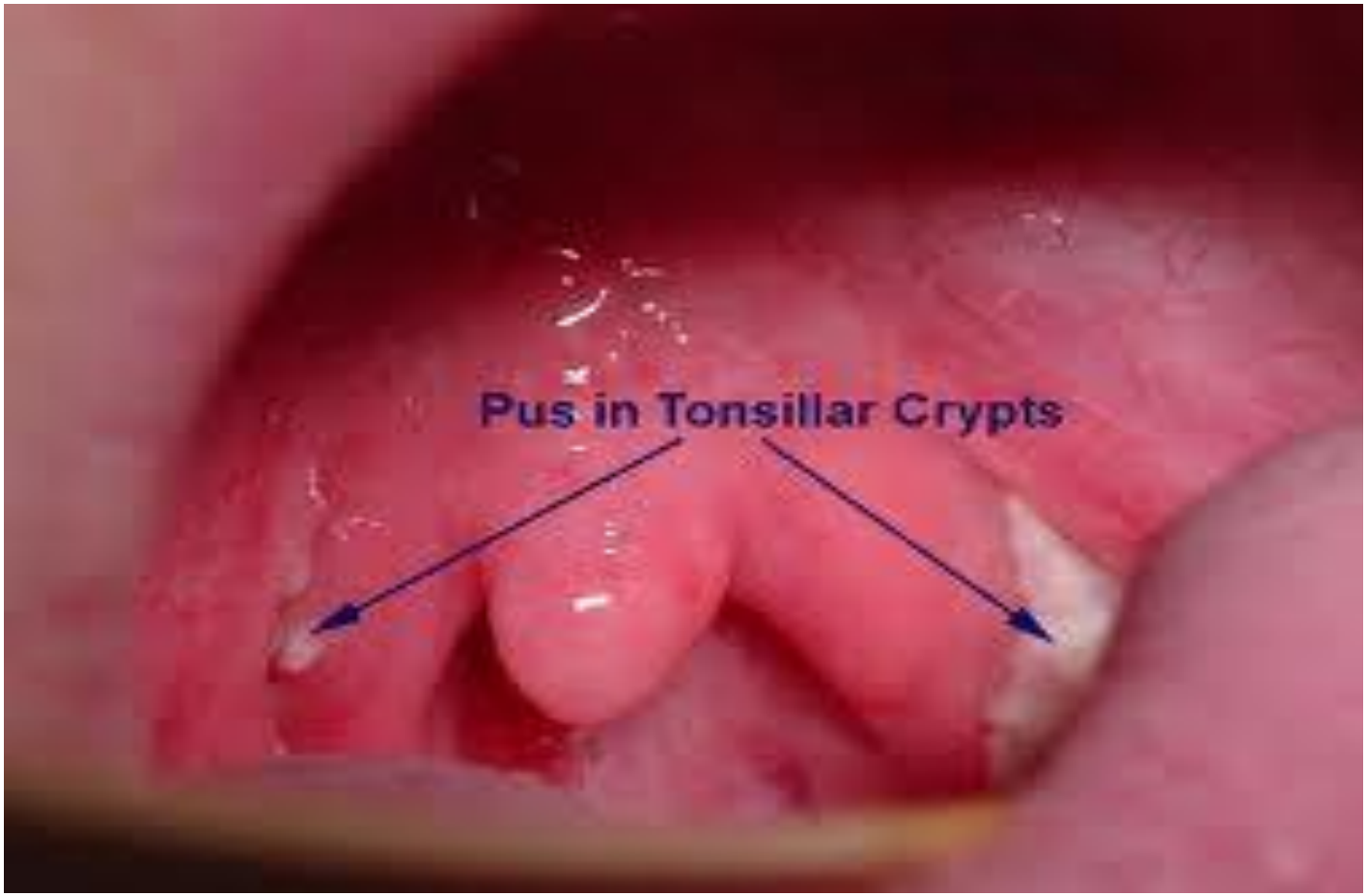
apt with syphilis who requires a treatment for so many months (maintenance) can receive benzathine penicillin instead of giving him crystalline or procaine penc..

Bacterial

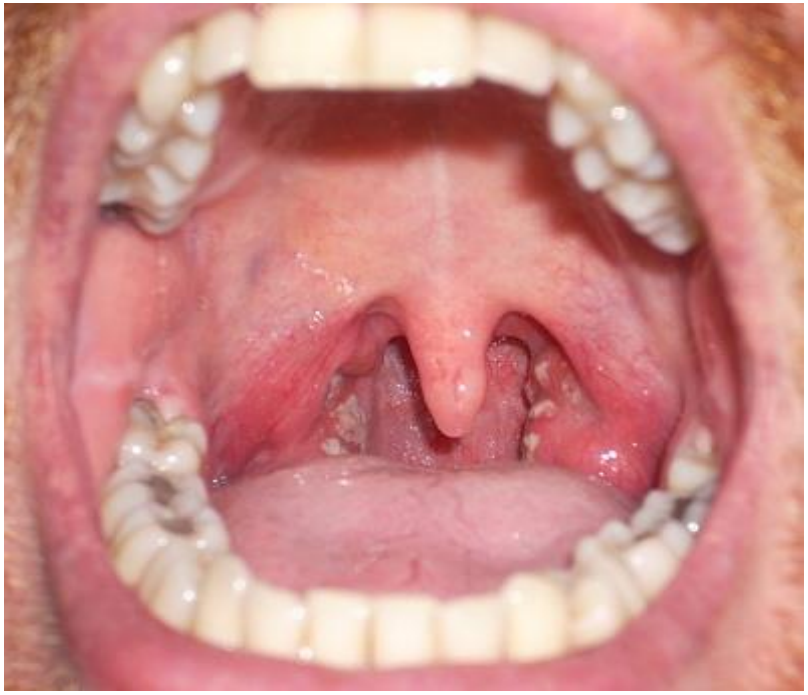


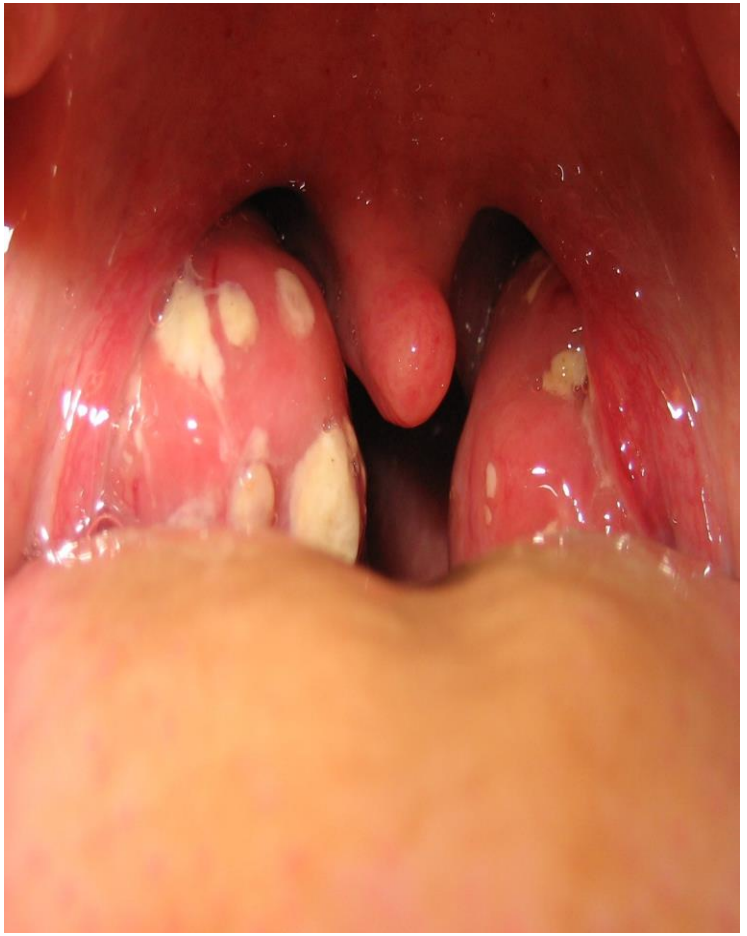
Viral




Pus in Tonsillar Crypts

Acute tonsillitis






Penicillin-G


Ospen® 500
filmtabletta
Orvosi rendelvényre
12 db
SANDOZ


Retarpen®
2,4 Mega IE
1 Trockenstechampulle mit Suspendierungsmittel
Antibiotikum
SANDOZ


Retarpen® 2,4
SANDOZ
Retarpen 240 萬 IU/Vial
瑞達平 注射劑

2. Extended-spectrum Penicillins or Aminopenicillin:

Ampicillin and amoxicillin

Ampicillin	Amoxicillin
❖ (IV, Oral) is given every 6h (4x1). ❖ must be taken on empty stomach.	❖ (IV, Oral) is given every 8h (3x1). ❖ better absorbed orally.

Ampicillin

- (IV, Oral) is given every 6h (4x1).
- must be taken on empty stomach.
- Is used in Bacillary Dysentery. WHY???

1g (4x1) for 5 days + fluid.

- Diarrhea is common side effect WHY????

Amoxicillin

- (IV, Oral) is given every 8h (3x1).
- better absorbed orally.
- Is employed prophylactically by dentists for patients with abnormal heart valves who are to undergo extensive oral surgery..
- used in treatment of peptic ulcer to eradicates H.Pylori.
- Otitis media.

B-Lactamase Inhibitors
clavulanic acid.

- Has **NO or lack or very weak** antimicrobial effect.

- Binds irreversibly to B-lactmase→ protect hydrolyzable pencillins from inactivation by these enzymes.

Major S.E :- GI upset. (due to clavulanic acid)

Augmentin®:

consists of **Amoxicillin + Clavulanic acid.**


Augmentin
amoxycillin + clavulanate potassium
Twice Daily Dosing
14 tablets
1 g
SB SmithKline Beecham Pharmaceuticals


Augmentin
Augmentin
156 mg / 5 ml
amoxicilin
potencovaný
klavulanátom
100 ml sirupu
v práškové forme
K vnútornému užitiu
SB SmithKline Beecham

3- Anti staphylococcal penicillins
Also called anti-staph or penicillinase resistance pencillins.

- Strains of staphylcoccus resistant to these drug called : methicillin- resistant staphylococcus aureus (MRSA).

A serious source of nosocomial (hospital-acquired) infections.

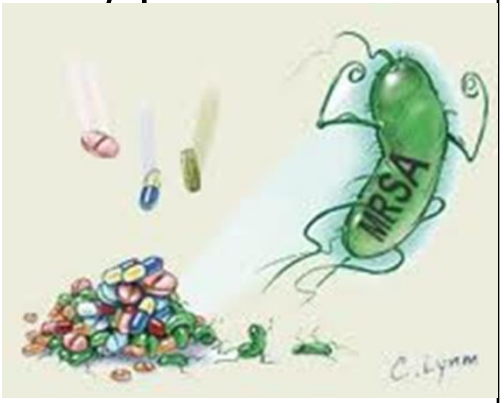
- MRSA commonly respond to ***vancomycin***.

3- Anti staphylococcal penicillins
Also called anti-staph or penicillinase resistance pencillins.

Ex. Methicillin, Flucloxacillin, Cloxacillin

❖Given IV & orally. (every 4-6 hr)

❖They are restricted to the treatment of infections caused by penicillinase-producing staphylococci.



❖Because of its nephrotoxicity caused by **methicillin nowadays this drug is not** used clinically.

❖Strains of staphylcoccus resistant to these drug called :
methicillin- resistant staphylococcus aureus (MRSA).
A serious source of nosocomial (hospital-acquired) infections.

4- Anti pseudomonal Penicillins:

Ex. **piperacillin**

Ps.aeruoginosa: G-ve bact Lacks porins → Making these organism resistant to many antimicrobial agents.

❖Pse.aeruginose →very difficult to deal with & produce resistance easily.

❖Given parentally not orally.
❖Piperacillin is the most potent of these antibiotics.

Antipseudomonal penicillins

- ***piperacillin with tazobactam***,

extends the antimicrobial spectrum to include penicillinase-producing organisms.

- All the penicillins cross the placental barrier, but **none has been shown to be teratogenic.**

- the inflamed meninges are more permeable to the penicillins.

- Penicillin levels in the prostate are insufficient to be effective against infections, penetration into bone, cerebrospinal fluid (CSF), is insufficient

- **Probenecid** inhibits the secretion of penicillins by competing for active tubular secretion via the organic acid transporter and, thus, can increase blood levels

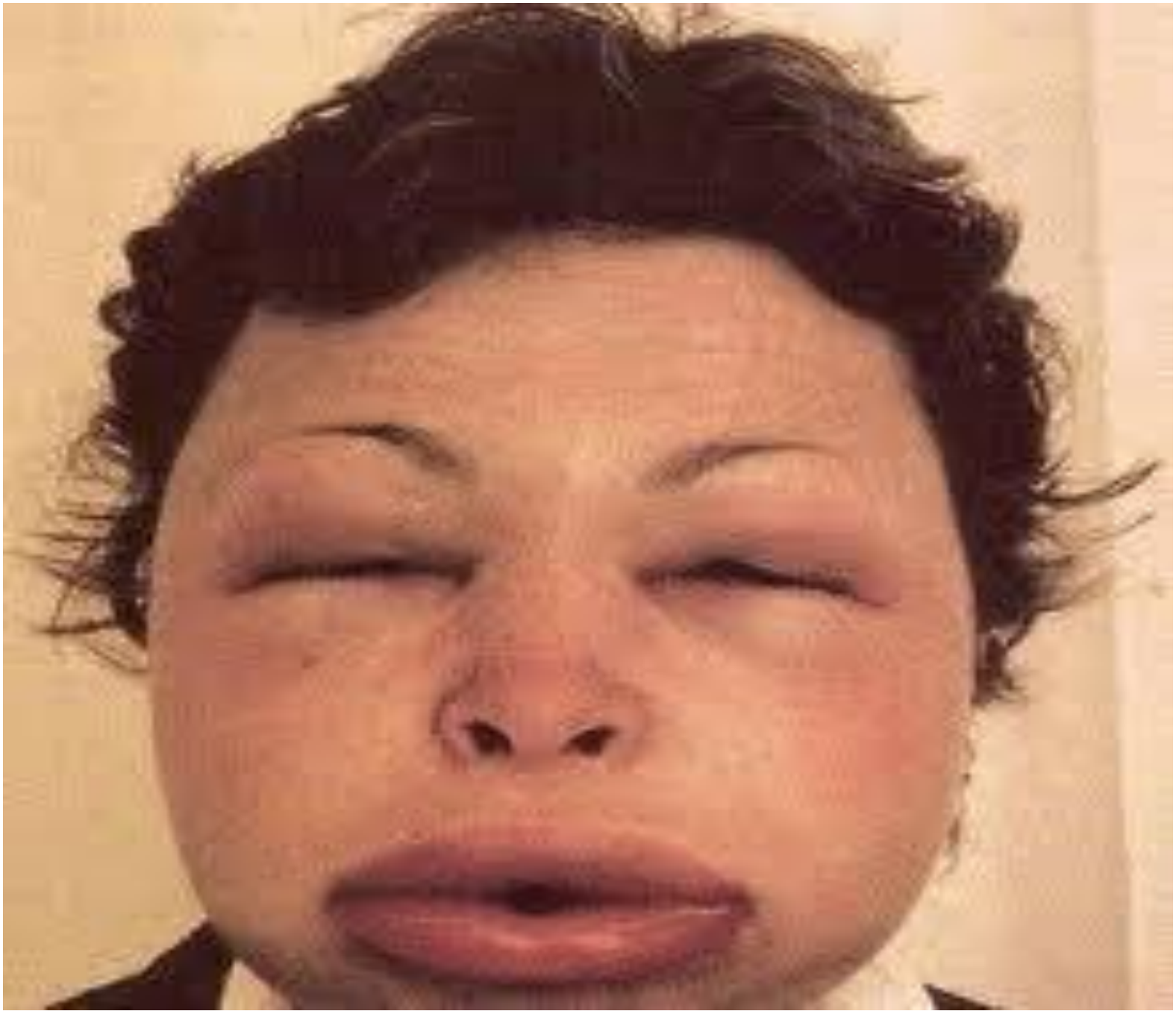
Adverse reactions of penicillins

1-Hypersensitivity reaction :

- ✓ ranging from rash to angioedema & anaphylaxis.
- ✓ Cross sensitivity with other β-lactam as cephalosporins.
- ✓ Should be avoided if history is positive.

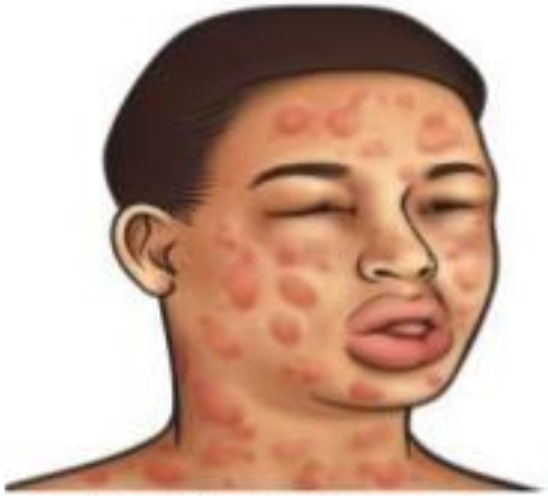
❑ To treat anaphylaxis:

- ✓ **Maintain air way**
- ✓ **Epinephrine** ,by which rout given??
- ✓ **Antihistamine** .
- ✓ **Hydrocortisone.**



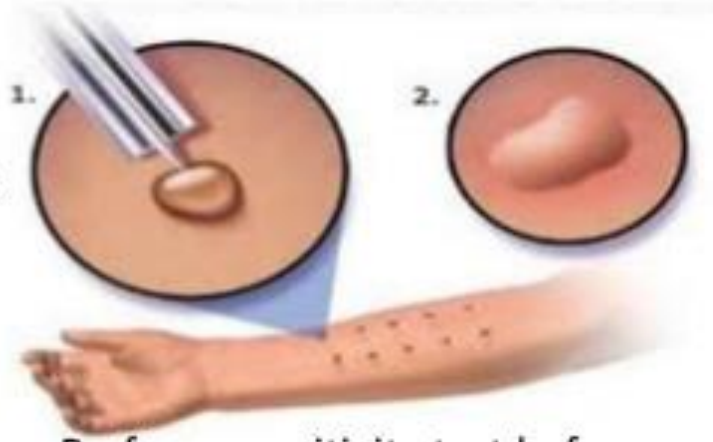
Hypersensitivity reaction

- All AMAs are capable to causing hypersensitive reaction, and this this reactions are unpredictable and unrelated to dose. E.g.: Penicillin induced anaphylactic shock (prick skin testing)

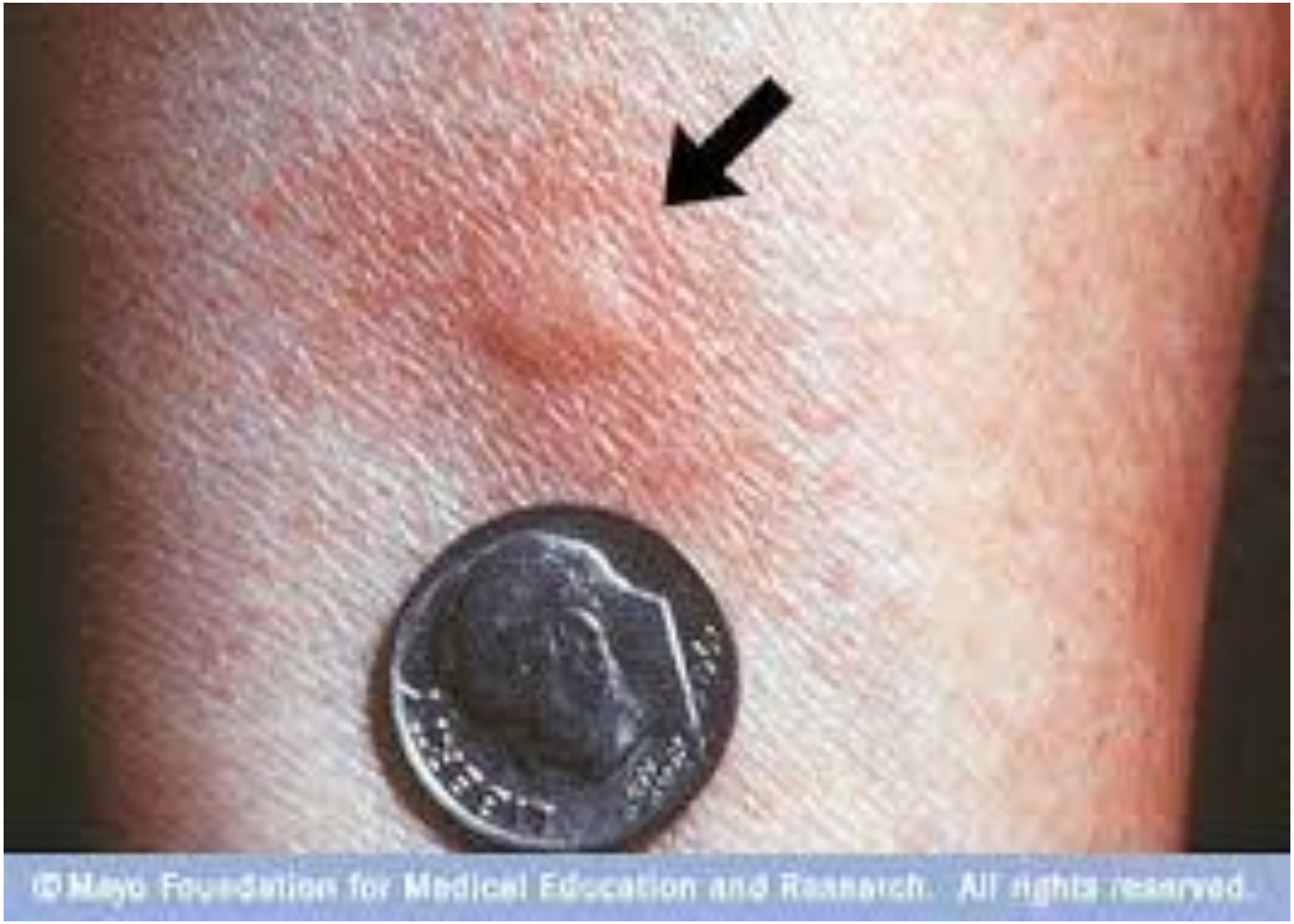


Inj. Penicillin induced anaphylactic shock

To avoid



Perform sensitivity test before administering penicillin Inj.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2-Diarrhea (most common): it is a common problem mainly with (Ampicillin).

Pseudomembranous colitis may occur.

- to treat Pseudomembranous colitis :
  - **Stop the drug .**
  - **Rehydration with electrolytes (fluid).**
  - **Metronidazole → If no response Vancomycin.**

pseudomembranous colitis

- inflammation of the colon that occurs in some people who have taken antibiotics. it is sometimes called antibiotic-associated colitis or C. difficile colitis. It is almost always associated with an overgrowth of the bacterium Clostridium difficile.

- Severe pseudomembranous colitis can be life-threatening. However, treatment is usually successful.

CEPHALOSPORINS

BY
V. SUSHIL

II. CEPHALOSPORINS

Suffix : Cef or Ceph

- A wider spectrum than penicillins.
- More resistance to B-lactmases enzyme.
- Eliminated by kidney.
- More expensive than penicillins.

Classification

to four major groups

More active against G-

More active against G+

1st Generation

Cefazolin, Cefadroxil

2nd Generation

Cefoxitin

3rd Generation

Cefotaxime, Ceftriaxone

4th Generation

Cefepime

Equally active on both G- & G+

Cephalosporins

Gram + activity — 1st Generation — β-lactamase sensitive

2nd Generation

Gram — activity — 3rd Generation — β-lactamase resistant

4th Generation: good Gram + and Gram - activity;
more resistant to β-lactamase

(1st. Gen.)	(2nd. Gen.)
Cefazolin (IV) Cefdroxil (oral)	Cefoxitin.(IM or IV)
cefazolin Surgical prophylaxis (orthopedic surgery) ??? Give 1g at induction of anesthesia because **cefazolin good penetration to bone.** **Cefodroxil (2x1):** **UTI,RI & sinusitis.**	**Cefoxitin** Surgical prophylaxis: (Internal abdominal & pelvic infection). Why??? Against anaerobic M.O (bacteroides fragilis). Give 2g at induction of anesthesia.

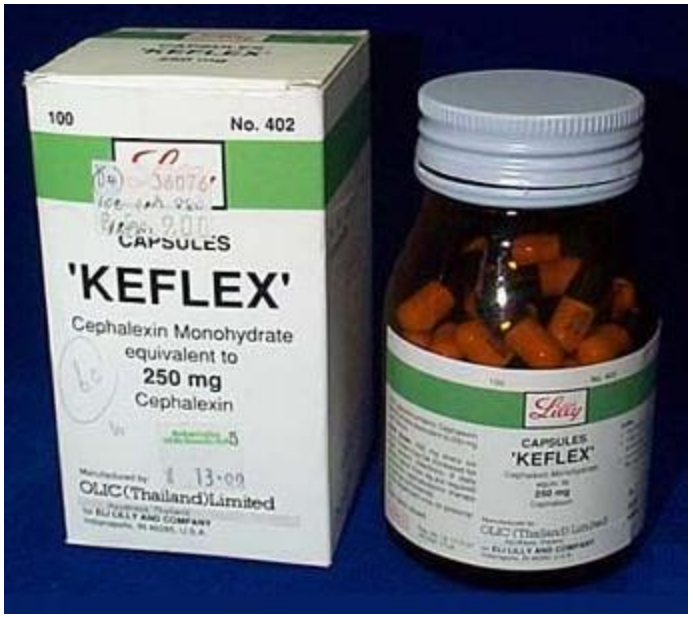
(3rd. Gen.)	(4th . Gen.)
Cefotaxime, (IV) Ceftriaxone, (IV) Ceftazidime	Only parenteral Ex.Cefapime
The main adv of 3rd generation : their easy penetration to the CSF **Ceftriaxone, Cefotaxime** **Due to Easy penetration to CSF** **DOC** in :- are effective in the treatment of neonatal and childhood **meningitis** caused by H.influenzae**.** meningococcal meningitis. *Brain abscess* *Alternative to aminoglycoside* • **Ceftazidime active against P.A** • **Ceftriaxone** Excretion: mainly in the bile = no need to adjust for renal insufficiency	Wider spectrum Used in Infection (organism) resistance to other cephalosporin.

Adverse effects

- ✓pain after injection.
- ✓Diarrhea.
- ✓Hypersensitivity reaction (10% cross- sensitivity)

Adverse effects

- Allergic reaction: cross allergy with pencillin(5-15%).
- Some have anti-Vitamin K effect(bleeding).
- Some can cause a disulfiram – like reaction.
- False positive glucose test.
- Pain at site of injection.
- Diarrhea .
- neutopenia ,--------



NDC 63323-237-10 23710

CEFAZOLIN

FOR INJECTION, USP

1 gram*

FOR INTRAVENOUS OR INTRAMUSCULAR USE
Rx only

25 Single Use Vials


Zinnat
tablety 125
Glaxo
Zinnat
tablety 250
Glaxo


Ceftriaxone Sandoz®
1 g
Ceftriaxone 1 g
(as Ceftriaxone Sodium)
Inj. B.P.
1 vial / flacon-ampoule / frasco ampolla
i.m./i.v.
SANDOZ


Claforan® Sterile
cefotaxime for injection, USP
1g
FOR IM/IV ADMINISTRATION
Ten 1g Vials
sanofi aventis


Fortum™
2 grams
Ceftazidime 2 grams
(as pentahydrate)
for injection
2 grams
c202080154
gsk GlaxoSmithKline
Fortum™
1 gram
Ceftazidime 1 gram
(as pentahydrate)
for injection
1 gram
c269741458
gsk GlaxoSmithKline

3-Carbapenems	4-Monobactams
E.x.. **Imipenem.**	E.x. **Aztreonam.**
administered IV infusion or IM every 6-8 hrs	It is administered either IV or IM. Every 8 hrs
✓Very Broad-spectrum coverage. **Empiric therapy**	narrow spectrum.
Clinical application:- life threatening infection . combined with cilastatin	• Only against G- aerobic rod. • Aztreonam is resistant to the action of B-lactamases ❖this drug **may offer a safe** alternative for treating patients who are allergic to penic &/or cephalosporins.


MSD
TIENAM®
(Imipenem-cilastatin sodium, MSD)
IMIPENEM 500mg*
*(Anhydrous Equivalent)
CILASTATIN EQUIVALENT 500mg
500
SINGLE DOSE
For Intravenous Use Only


2 grams
AZACTAM®
(aztreonam for injection
Bristol-Myers
Squibb Company
© 2002 GSM

Carbapenem

- Imipenem , meropenem
- they Should be reserved to infection that are not responding to other antibiotic.

- These β-lactams antibiotics show cross sensitivity with Penicillins
- Imipenem/cilastatin and meropenem are the broadest-spectrum B-lactam antibiotic.
- Imipenem resists hydrolysis by most B-lactamases,
- Imipenem plays a role in empiric therapy .

Other cell wall inhibitor vancomycin

Vancomycin

Administered Oral , IV

Narrow spectrum

Bactericidal /not B-lactam

Orally:- every 6 hrs for refractory pseudomembranous colitis due to C. difficile.

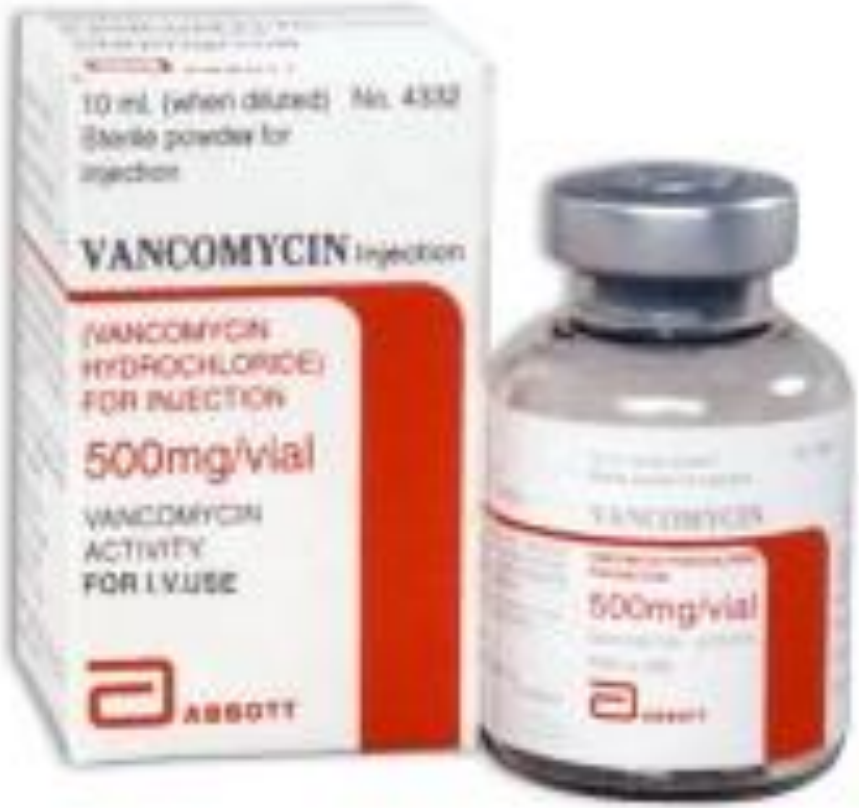
Slow IV infusion (1-2 hrs) for treatment of systemic infections or prophylaxis.

- ✓is effective against multiple drug-resistant organisms, such as MRSA.(DOC)

- ✓Vancomycin in combination with A.G alternative regimen to treatment of enterococcal endocarditis.

S.E:-

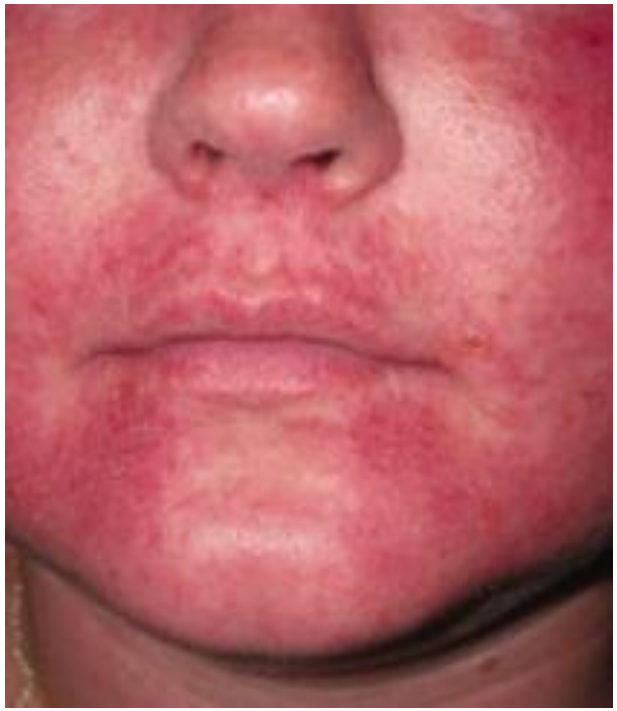
1-Flushing (**red man syndrome**) with a **rapid** infusion.(**More common**)
2- phlebitis(inflammation of vein) at site of injection.
3- ototoxicity & nephrotoxicity (rare) but increased risk when administered with A.G.

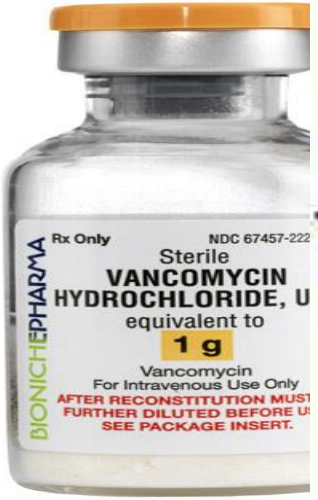

VANCOMYCIN injection
(VANCOMYCIN HYDROCHLORIDE) FOR INJECTION
500mg/vial
VANCOMYCIN ACTIVITY
FOR I.V. USE
ABBOTT

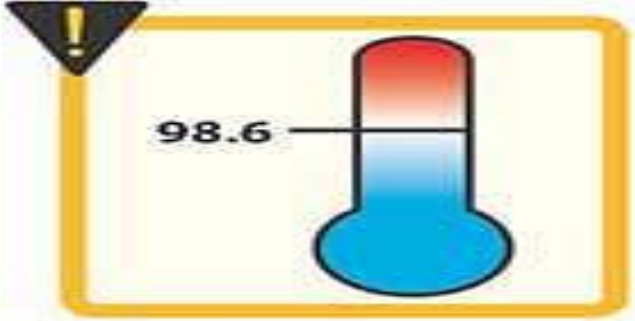

Vancomycin Hydrochloride
Capsules, USP 125 mg*
*Equivalent to 125 mg vancomycin
125 mg
Rx Only
20 Capsules
2 x 10 Unit Dose Packs
Not a Child-Resistant Container
Alvogen
SAL
729

Vancomycin
Clinical Uses

- Infections due to methicillin-resistant staph including bacteremia, empyema, endocarditis, peritonitis, pneumonia, skin and soft tissue infections, osteomyelitis
- Serious gram-positive infections in β-lactam allergic patients
- Infections caused by multidrug resistant bacteria
- Endocarditis or surgical prophylaxis in select cases
- Oral vancomycin for refractory *C. difficile* colitis

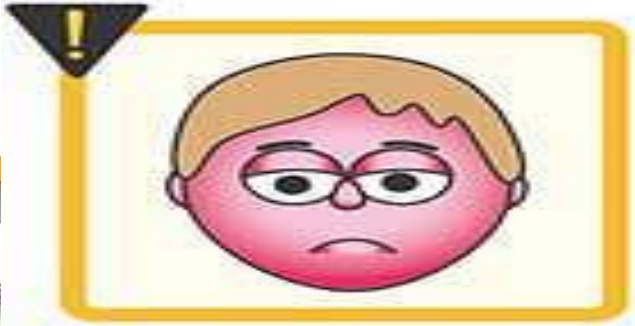






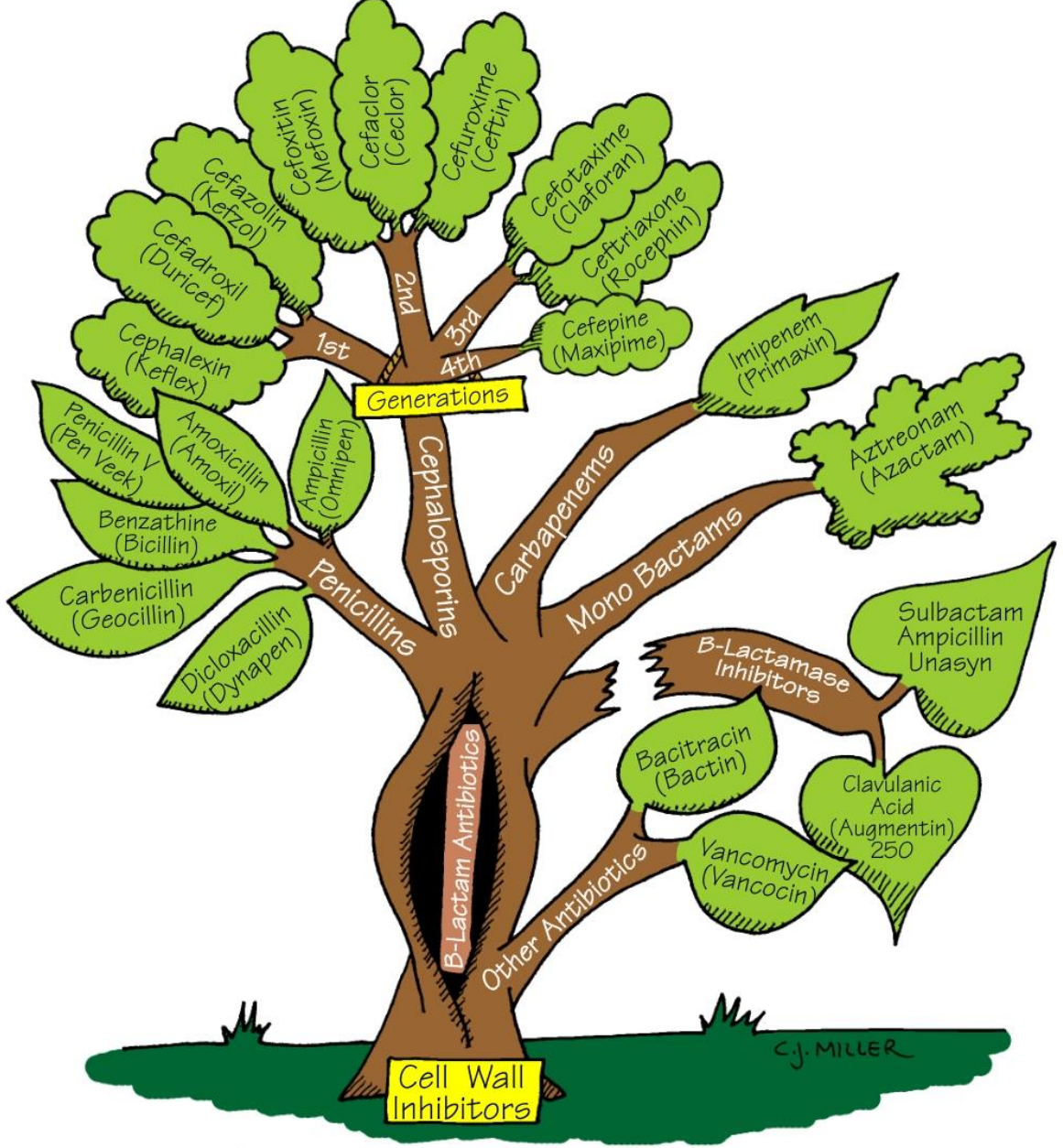
Fever

Chills



Flushing

Phlebitis



THE ANTIBIOTIC TREE