



## *Pharmacology Team*

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**Red**

**Purple**

**Orange**

**Black**

**Important**

Extra Notes

**General Explanation**

From the slides

# Introduction to Antibiotics

## 6<sup>th</sup> lecture

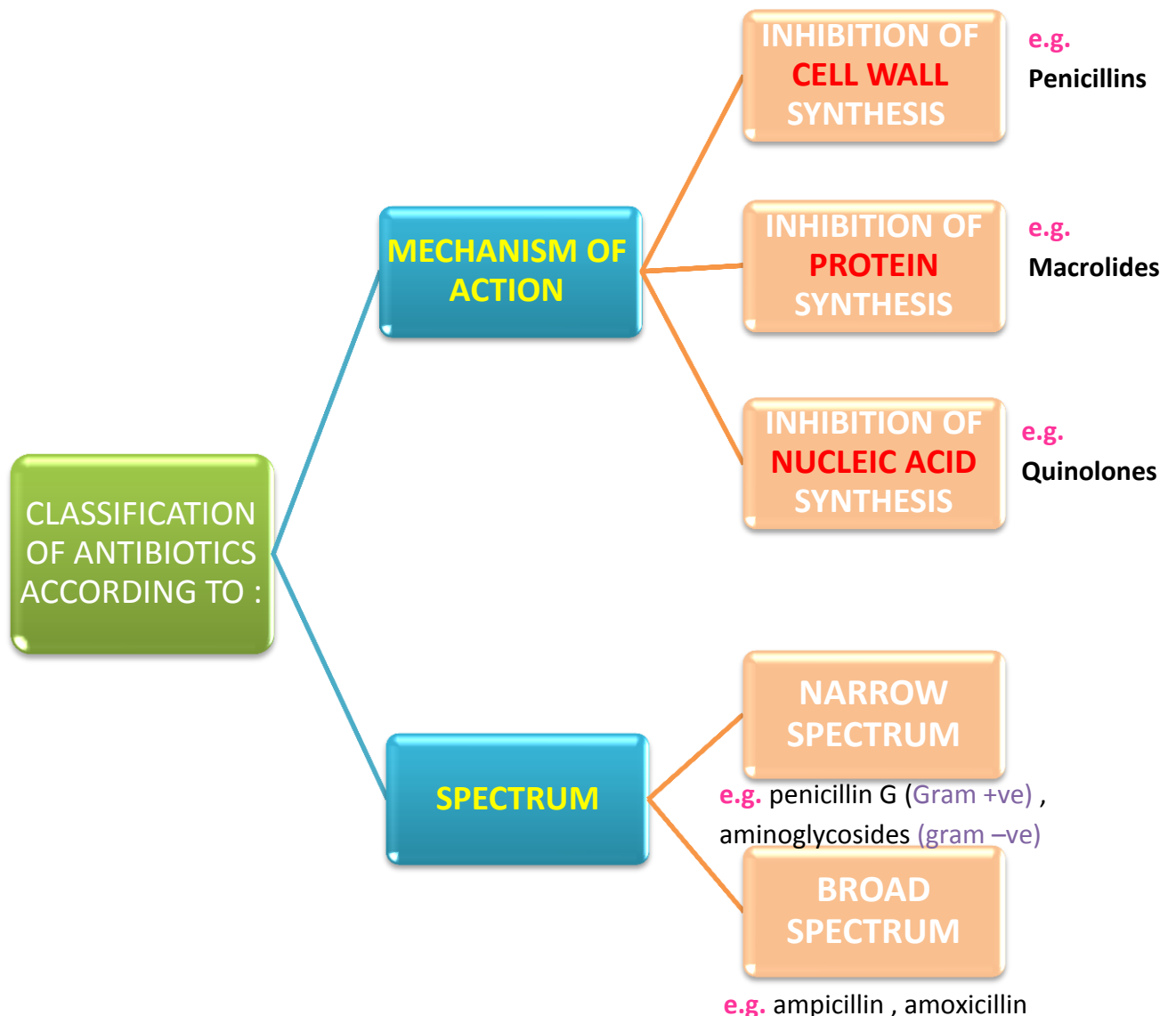
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**Objectives :**

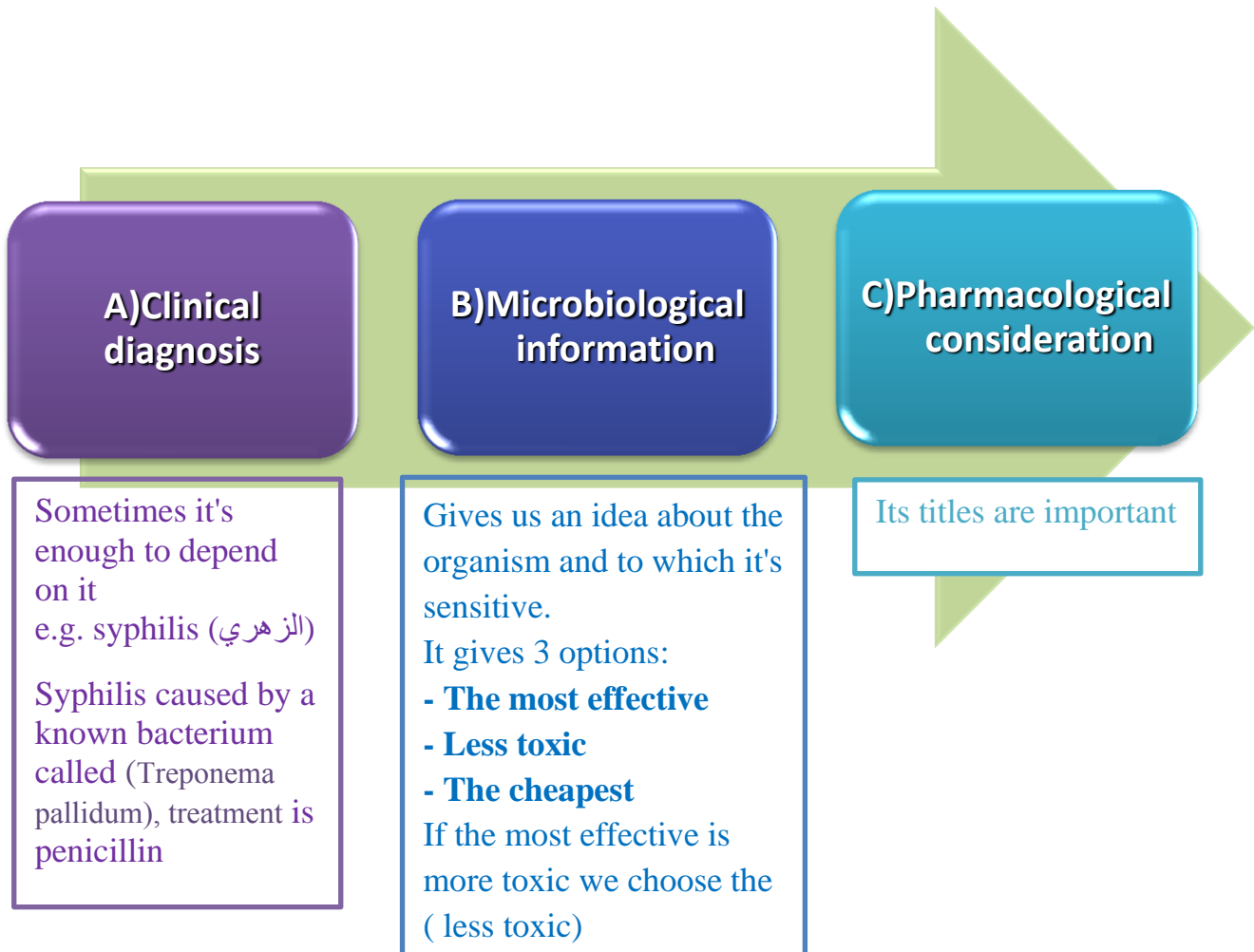
**\*we didn't find them**

## \* Definition of Antibiotics :

- Chemical substances produced by various microorganisms (bacteria, fungi, actinomyctes) that have the capacity to inhibit or destroy other microorganisms.
- Nowadays they are chemically synthesized. **90% natural in origin but it's purely synthetic**
- They either kill bacteria(bactericidal) or keep more bacteria from growing(bacteristatic).
- **Antibiotics will not cure infections caused by viruses.**



# Choice of Antibiotic



## B) Bacteriological information

Advantages	Disadvantages
❖ The exact antibiotic to be used	❖ Occasionally these tests do not parallel( <b>not accurate</b> ) in vivo sensitivity
❖ The most effective and reject the one with little or no activity	❖ Do not take in consideration certain sites of infection( <b>Infection in the brain and the antibiotic cant cross BBB, prescribe another one</b> )
❖ The least toxic	❖ some bacteria cannot be cultivated or take time to grow ( e.g. <i>M. Leprae</i> , <i>M. Tuberculosis</i> )
❖ The cheapest	❖ Bacteriological services are not available at all hospitals

## C) Pharmacological consideration

1. Site of infection

5. The cost of therapy

2. Host factors

3. Drug Allergy

4. Drug Safety

**a) Immune system**

**e.g.** Alcoholism, diabetes, HIV, malnutrition, advanced age- (higher than usual doses or longer courses are required ).

**b) Genetic factors**

**e.g.** Patients with G-6-PD deficiency treated with sulfonamides and chloramphenicol (Hemolysis)

**e.g.** glucose ( 6- phosphate dehydrogenase deficiency ) which is important for RBCs so not any drug given bcuz RBC hemolysis might happens

**c) Pregnancy and Lactation**

**e.g.** Aminoglycosides- ( hearing loss)  
Tetracyclines- (bone deformity)

**d) Age of the patient**

**e.g.** Grey baby Syndrome- (chloramphenicol), (because liver and kidneys haven't developed completely)

**e) Renal function**

**e.g.** Aminoglycosides ( renal failure)

**f) Liver function**

**e.g.** Erythromycin (hepatic failure)

**g) Poor perfusion**

**e.g.** Lower limbs of diabetics

**e.g.**

Chloramphenicol ( a plastic anemia)

Fluoroquinolones in children & Preg. ( tendon damage )

# Bacterial Resistance

Resistance: no response to antibiotics

## Mechanism of Bacterial resistance:

- Inactivation of antibiotics by enzymes produced by bacteria
  - \* For example: Staph bacteria release (beta lactamase or “penicillinase”) to reduce the affect of penicillin
- Reduced bacterial permeability to antibiotics
  - \*Cell wall of bacteria reduces permeability, by adaptation.
- Bacteria develops an altered receptor for the drug
  - \*Antibiotics have receptors for it's action, bacteria changes the place of these receptors and makes mutation thus antibiotic doesn't recognize it.
- Bacterial Mutation

## Prevention of Resistance:

- \*Use antibiotics only when absolutely required
- \*Use antibiotics in adequate dosage for sufficient period of time
  - Not too brief therapy
  - Not too prolonged therapy
- \*Combination of antibiotics may be required to delay resistance (e.g. TB )

## General Principles of Chemotherapy

- ❖ Administer drug in *full dose*, at *proper interval* and by the *best route*
- ❖ When apparent cure achieved , continue antibiotic for about 3 days further to avoid relapse

\*Using antibiotics for 3 days or more to make sure that the bacteria has died and not latent.

- ❖ Skipping doses may decrease effectiveness of antibiotic & increase the incidence of bacterial resistance.
- ❖ Indications for antibiotic combinations:
  - Mixed bacterial infections
  - Ill patient of unknown etiology
  - Prevent emergence of resistance
  - Achieve synergism \* Synergism : interaction of drugs such as the total effect is greater than the sum of individual
- ❖ Disadvantages of multiple antibiotics
  - Increased risk of sensitivity or toxicity
  - Increased risk of bacterial resistant
  - Possibility of antagonism
  - Higher cost
- ❖ In some infections bacteriological proof of cure is required .
- ❖ Measurement of plasma conc. of antibiotics is seldom (not often) needed. (Except on narrow therapeutic range drugs , ie: streptomycin “renal TB” and gentamicin “I.M”)

## Indications for antibiotics prophylaxis

\* Antibiotics Usually are not prophylactic except in some conditions (going it Hajj or omora) :D

- **Surgical prophylaxis**

bowel surgery, joint replacement, and some gynecological interventions to prevent postoperative infections.

\* In surgery, drain the bacteria to prevent internal infection

- **Immunosuppressed Patients**

Very old, very young, Diabetics, .....

- **Dental extractions**

Pts with total joint replacements

Pts with cardiac abnormalities

\* In dental extractions: organism goes from mouth to heart or joint

If u are confused that the patient has a bacterial or viral infection give him centomatic treatment or antipyretic analgesic drugs.

## MISUSES OF ANTIBIOTICS

☒ Wrong diagnosis

- e.g. viral infections

☒ Improper dosage.

☒ Therapy of fever of unknown origin.

☒ Presence of pus or necrotic tissues , or blood at the surgical site

☒ Excessive use of prophylactic antibiotics \* That develops bacterial resistance+ side effects

☒ Lack of adequate bacteriological information.



## **General Notes**

- 90% of upper respiratory tract infections are caused by a virus.
- Anti-biotics Shouldn't be used as Antipyretic (drugs that reduce fever).
- We give Anti-biotics for a viral infection in only one case, if the patient immunocompromised to prevent a secondary bacterial infection.
- For normal cases, narrow spectrum anti-biotics are better, because anti-biotics will kill both good and bad bacteria in your body.
- In case of emergency or mixed bacterial infection, broad spectrum anti-biotics are better.

# Questions

**1-Which antibiotic inhibits protein synthesis?**

**A- Macrolides    B-Quinonoles    C-Penicillin**

**2-Which condition indicates using antibiotic as prophylactic ?**

**A- G-6-PD deficiency    B- Pregnancy    C- Diabetes**

**3-One of the advantages of bacteriological informations ?**

**A- High cost antibiotic    B-Less effective    C-Less toxic**

**4-Which antibiotic inhibits NUCLEIC ACID synthesis?**

**A- Macrolides    B-Penicillin    C-Quinonoles**

Question	Answer
1	<b>A</b>
2	<b>C</b>
3	<b>C</b>
4	<b>C</b>