ANTIBIOTIC RESISTANCE

•An **antibiotic** is a **compound** or **substance** that **kills** or **slows** down the growth of microorganisms.

HISTORY

The first antibiotic was penicillin, discovered accidentally by Alexander Fleming when he observed that colonies of the bacterium Staphylococcus aureus could be destroyed by the mold **Penicillium notatum** in 1928

Today over 100 different antibiotics are available to doctors to cure minor discomforts as well as life-threatening infections

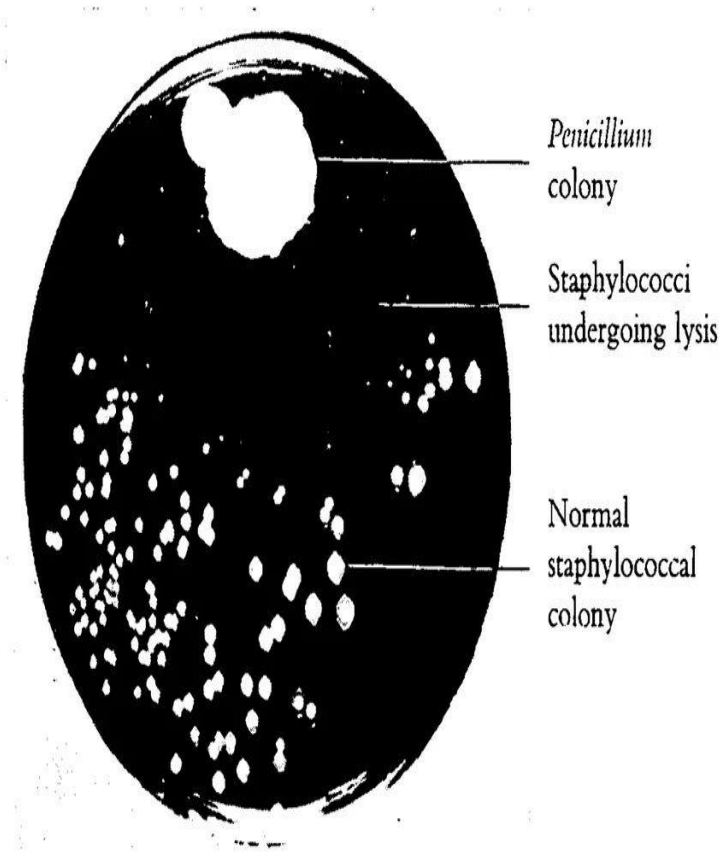


Fig. 1. Photograph of a culture-plate showing the dissolution of staphylococcal colonies in the neighbourhood of a *Penicillium* colony.

Sources of antibiotics

1-Natural

mainly fungal sources

2-Semi-synthetic

Chemically altered natural compound.

3-Synthetic

Chemically designed in the lab

CLASSIFICATION

There are several classification schemes for antibiotics based on:

- bacterial spectrum (narrow, broad).
- route of administration(injectable, oral or topical)
- type of activity (bactericidal or bacteriostatic)

But the most useful classification is based on chemical structure. Compounds within a structural class will generally show similar patterns of effectiveness and toxicity:

Penicillins:

are generrally bactericidal-that is, they kill bacteria rather than inhibing growth, such as penicillin

Cephalosporins :

Are subgrouped into 1st,2nd and 3rd generations.Each generation has a broader spectrum of activity than the one before such as caphalexin

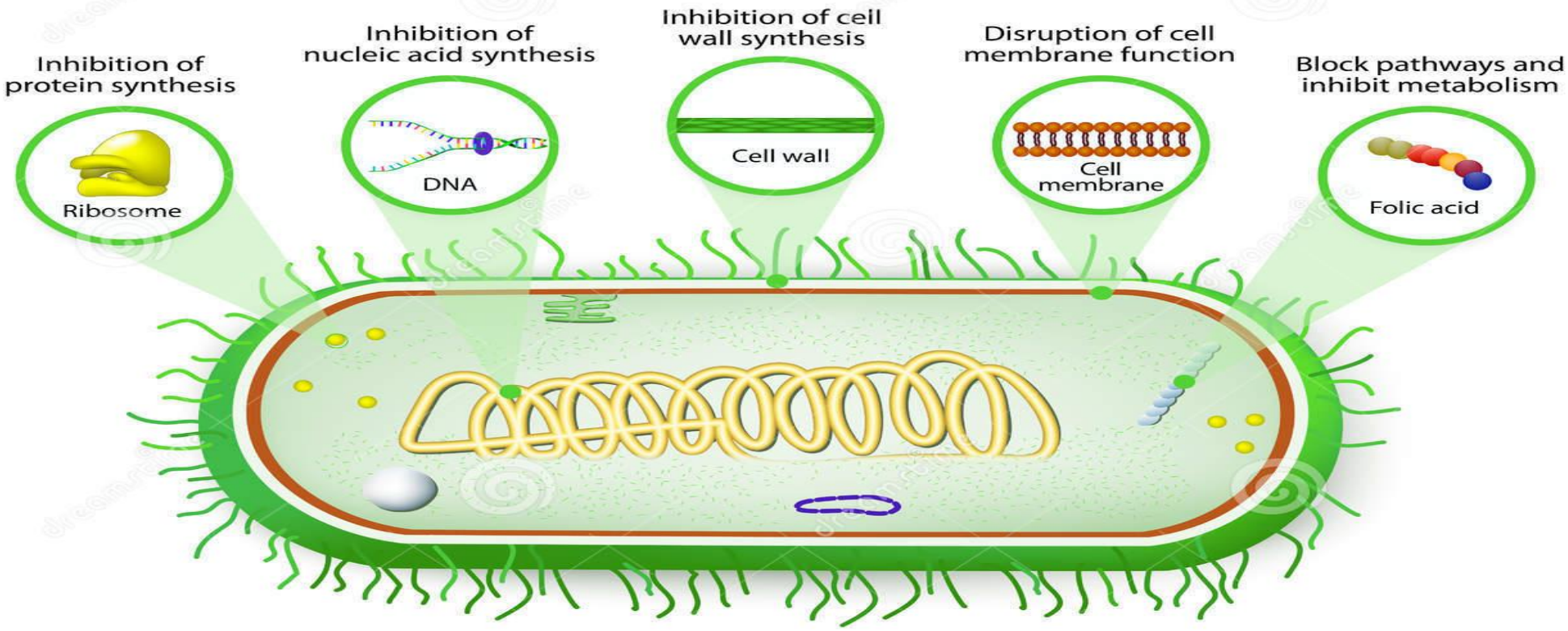
Macrolides :

Macrolides got their name because they all have a macrocyclic lactone chemical structure such as erythromycin.

HOW ANTIBIOTIC WORK?

- Inhibition of cell wall synthesis
- Interfering with protein synthesis
- Alteratiion of cell membrane
- Inhibition of nucleic acid synthesis
- Inhibiting the synthesis of essencial metabolites

MECHANISMS OF ANTIBIOTIC ACTION



TYPE OF RESISTANCE

- **Antibiotic resistance :**

Inherent properties of the bacterium are responsible for preventing antibiotic action. Penicillin G for example is unable to penetrate the gram negative cell wall

- **Acquired resistance:**

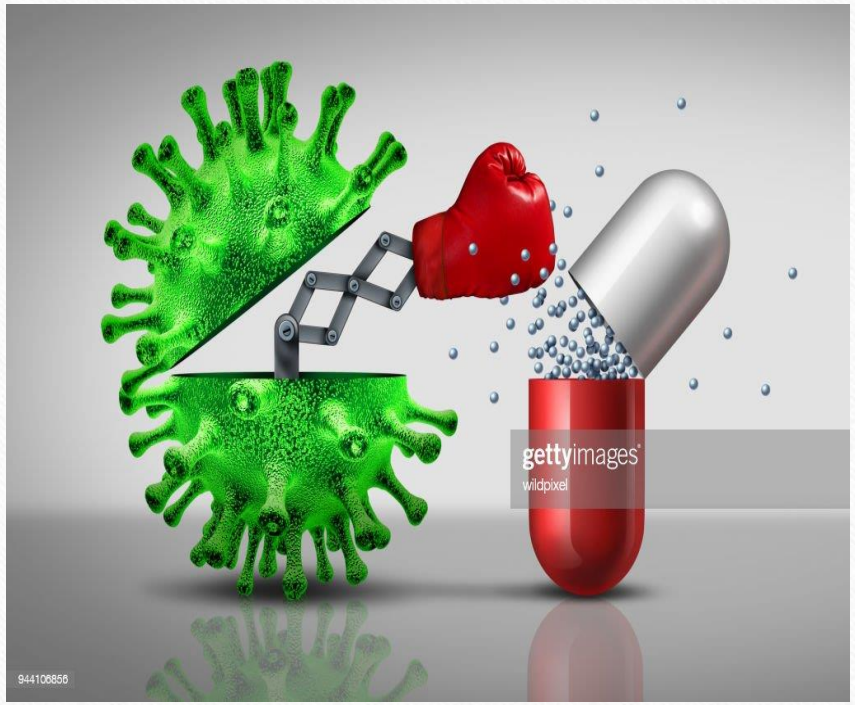
Microorganismes generally acquired antibiotic resistance by genetic changes.

Genetic bases of acquired resistance

- Chromosomal mutation
- Plasmids
- Transposons

Mechanisms of bacterial resistance to drugs

- Development of an altered drug target
- Decrease the concentration of the drug
- Production of drug inactivating enzyme
- Synthesis of resistant metabolic pathway
- Failure to metabolize the drug



Food-producing animals develop drug-resistant bacteria in their gut when antimicrobial substances are used for therapy and/or prophylaxis of bacterial infections in them or with antimicrobial substances' administration in animal feeds as growth promoters

Human beings get antibiotics and develop drug-resistant bacteria in their gut.

Fertilizer including drug-resistant bacteria can be used on food crops

Drug-resistant bacteria remain on meat of these animals and/or on food crops that manure or sewage water is used for fertilization and irrigation, and they can be eaten by human beings

Human beings directly spread drug-resistant bacteria to other people in the public or to vulnerable patients at the hospital or drug-resistant bacteria indirectly spread to other patients from surfaces within the hospital


Thank
you!!