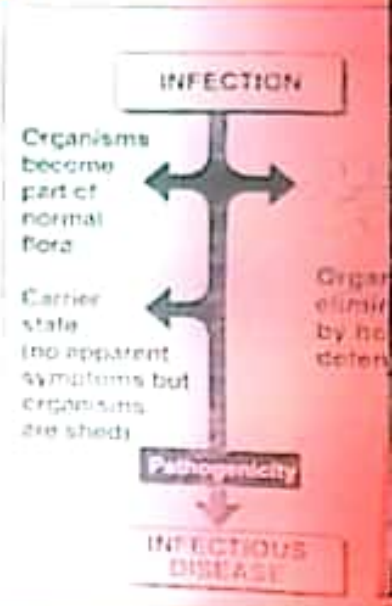
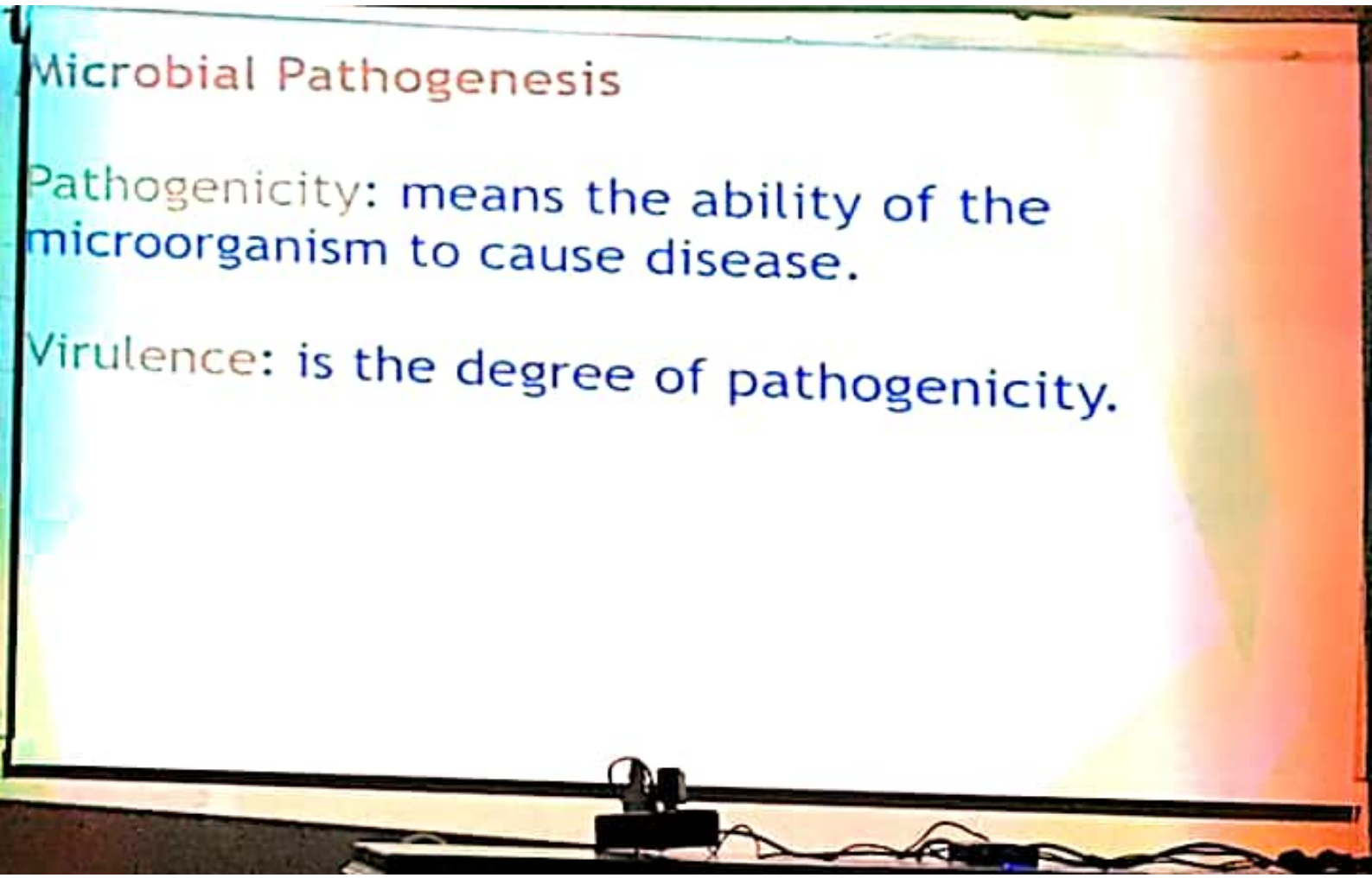
Principles of Infectious Diseases

Most infectious diseases are initiated by **colonization**: That is, the establishment of proliferating microorganisms on the skin and mucous membranes.

- Infection: one of the following occurs:
  - **Subclinical or silent infection:** no apparent signs and symptoms(carrier).
  - **Infectious disease:** when the organism causes tissue damage and impairment of body function





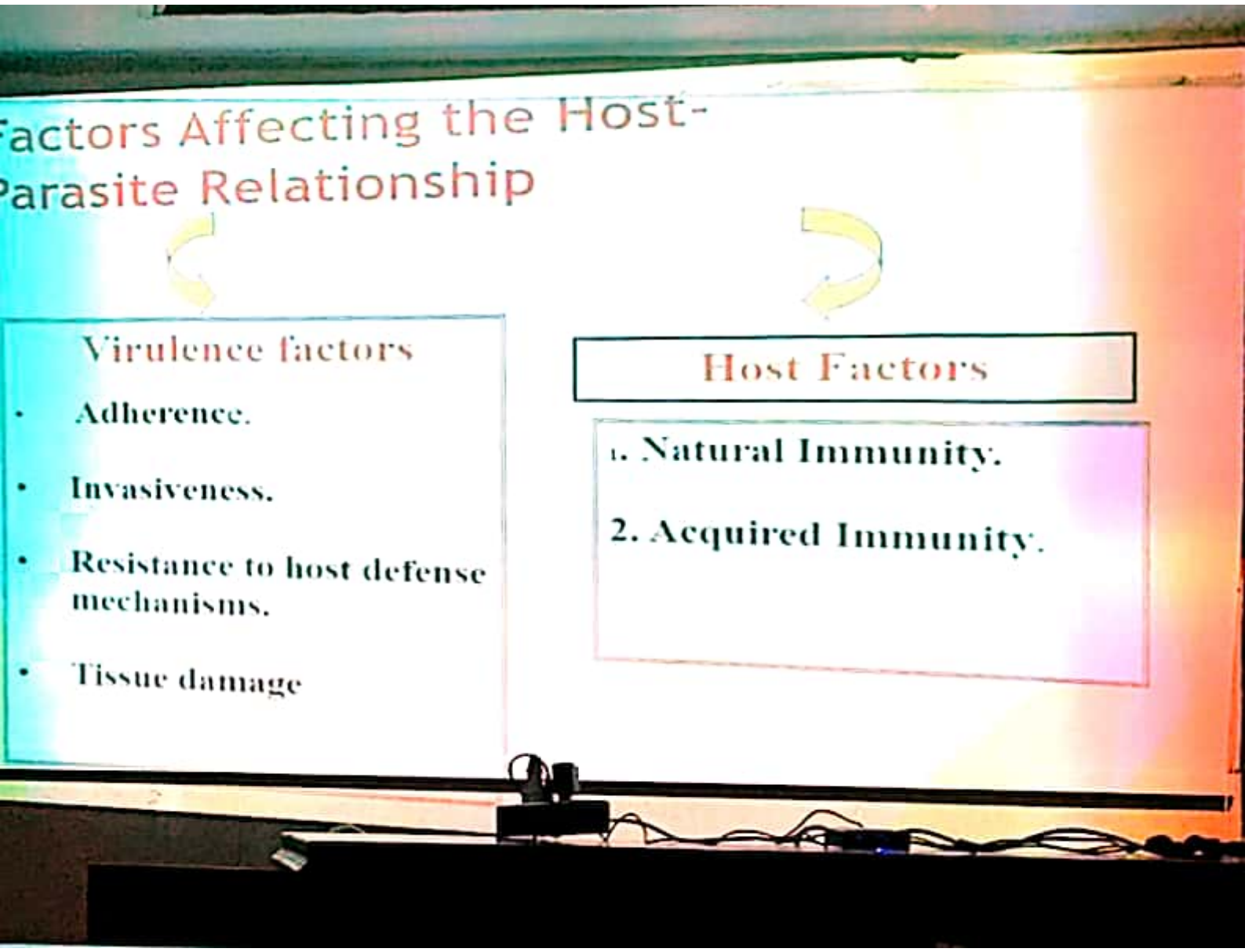
Factors Affecting the Host-Parasite Relationship

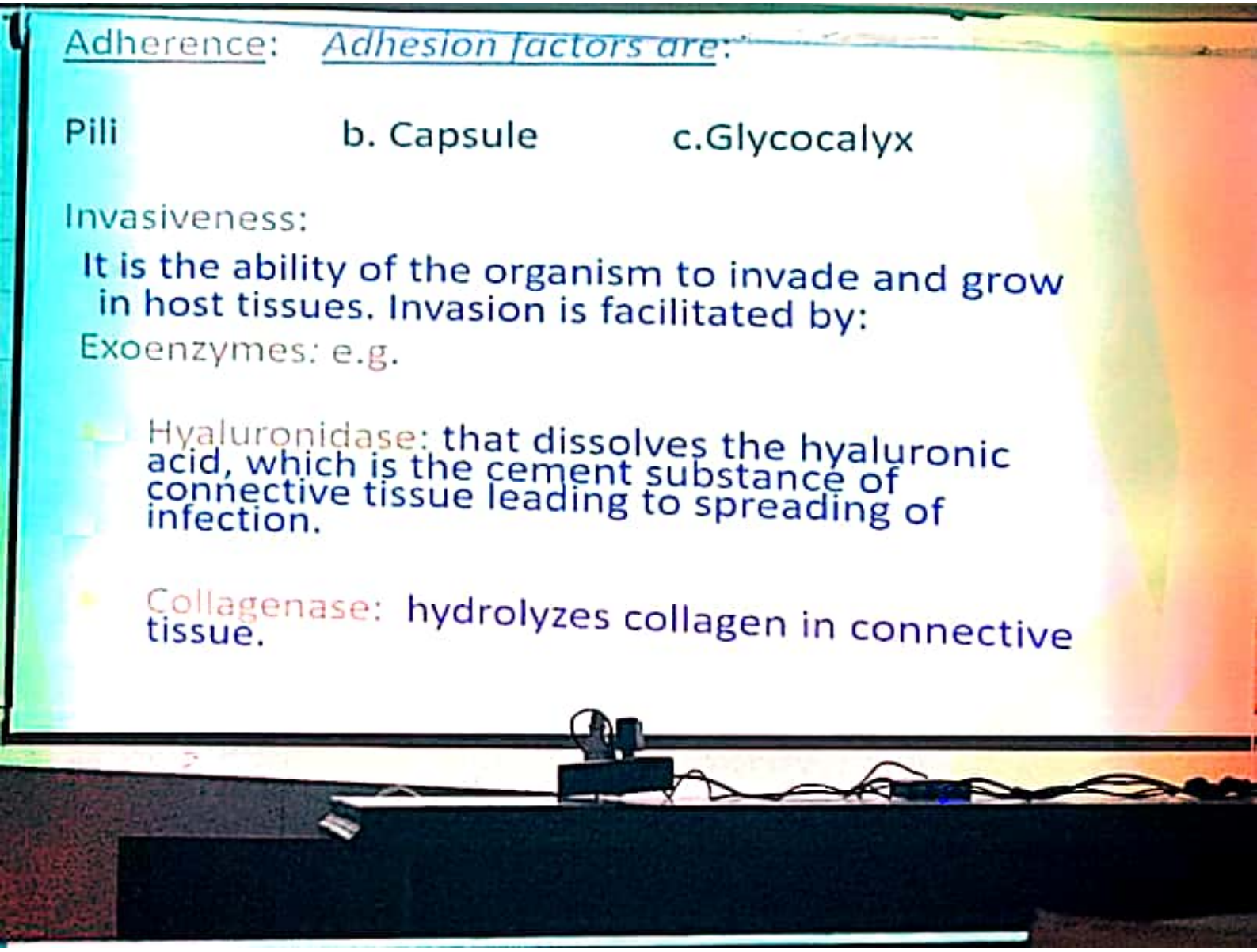
Virulence factors

- Adherence.
- Invasiveness.
- Resistance to host defense mechanisms.
- Tissue damage

Host Factors

1. Natural Immunity.
2. Acquired Immunity.





Resistance to host defense mechanisms:

Capsule: Antiphagocytic: The capsule prevents the phagocytes from adhering to the bacteria.

b. Coagulase that converts fibrinogen in plasma to fibrin: causing deposition of fibrin on the surface of the organism; thus protecting the organism from phagocytes.

c. Leukocidin: destroy neutrophils and macrophages escape phagocytosis.

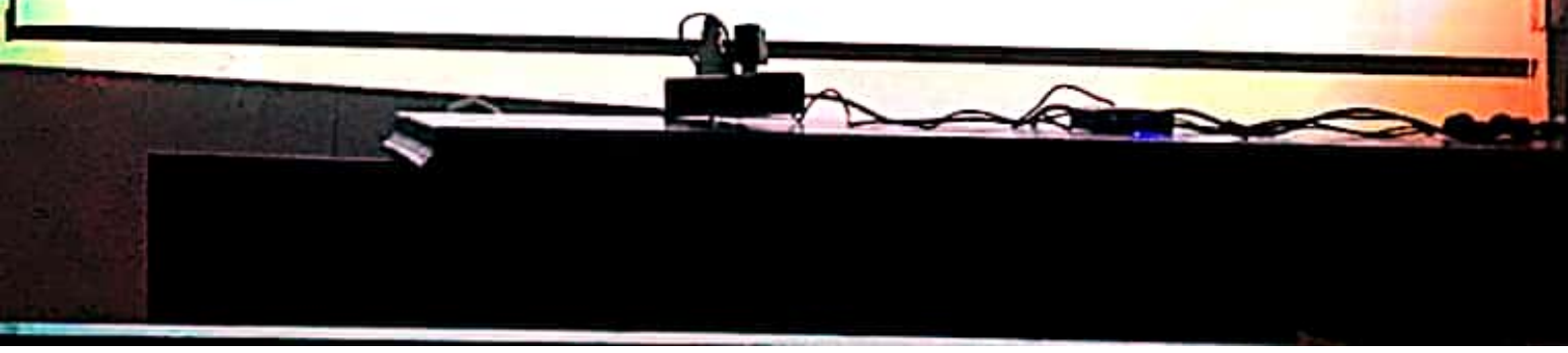
Damage of host cell:

The microorganism can damage host cells by:

a. Stimulation of inflammatory response: hypersensitivity reactions.

b. Production of toxins.

Exotoxins	Endotoxins
Excreted by living bacterial cells; found in high concentrations in fluid media.	Integral part of bacterial cell walls.
Usually from Gram +ve bacteria.	Usually from Gram -ve bacteria.
Protein in nature	Lipopolysaccharide
Very specific in its action.	Not specific in its action.
Can be converted into toxoids (non toxic preparations used in vaccinations	Can not be converted to toxoids.



MCQ

Resistance of bacteria to host defense mechanisms through :

a. collagenase

b. capsule

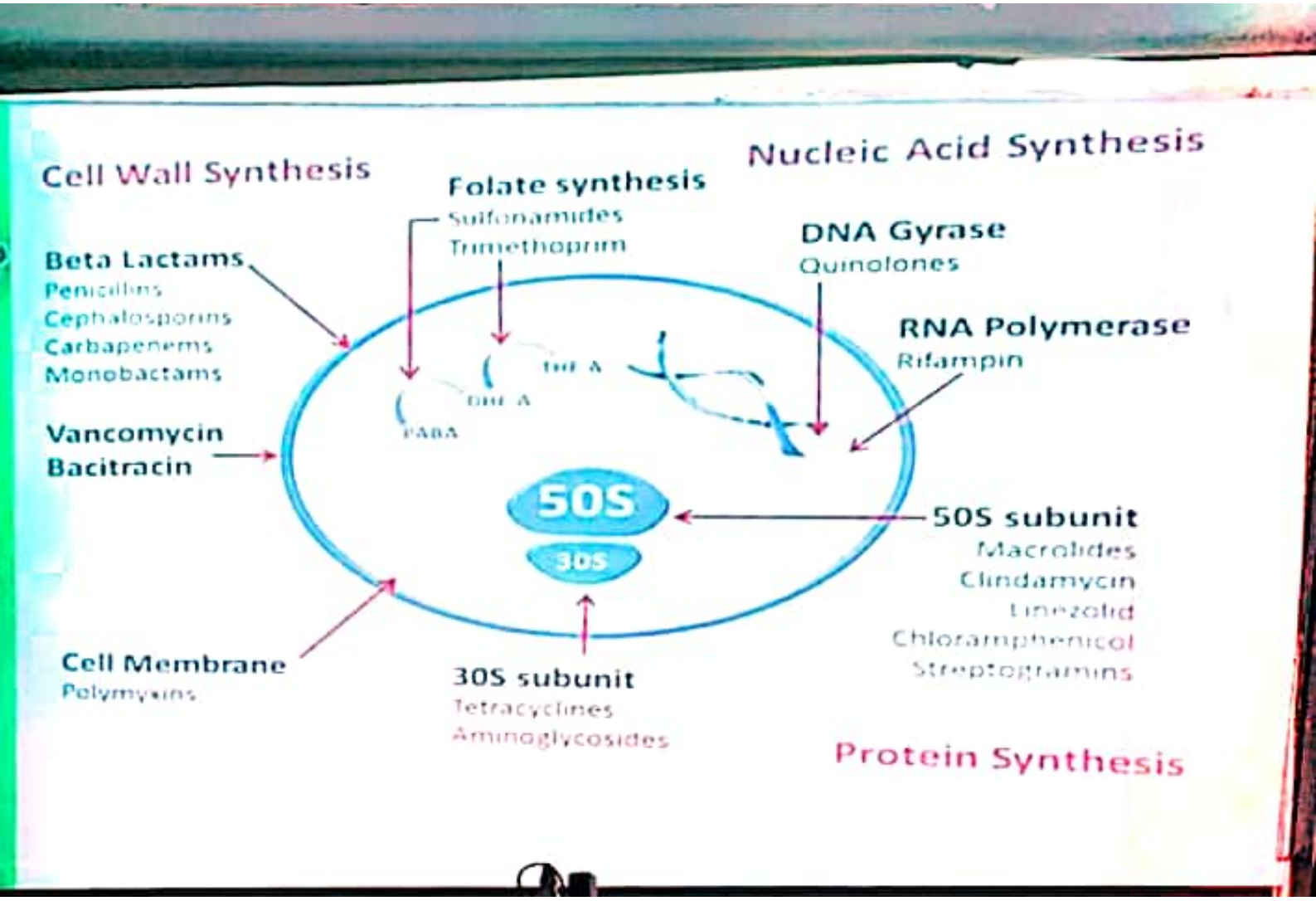
c.coagulase

d.both b&c

e.both a&c

There are four major sites in the bacterial cells that are sufficiently different from the human cell that they serve as the basis for the action of antibacterial agents:

A. Cell wall.
B. Ribosomes.
C. Nucleic acids.
D. Cell membrane



Properties of an ideal antimicrobial agent

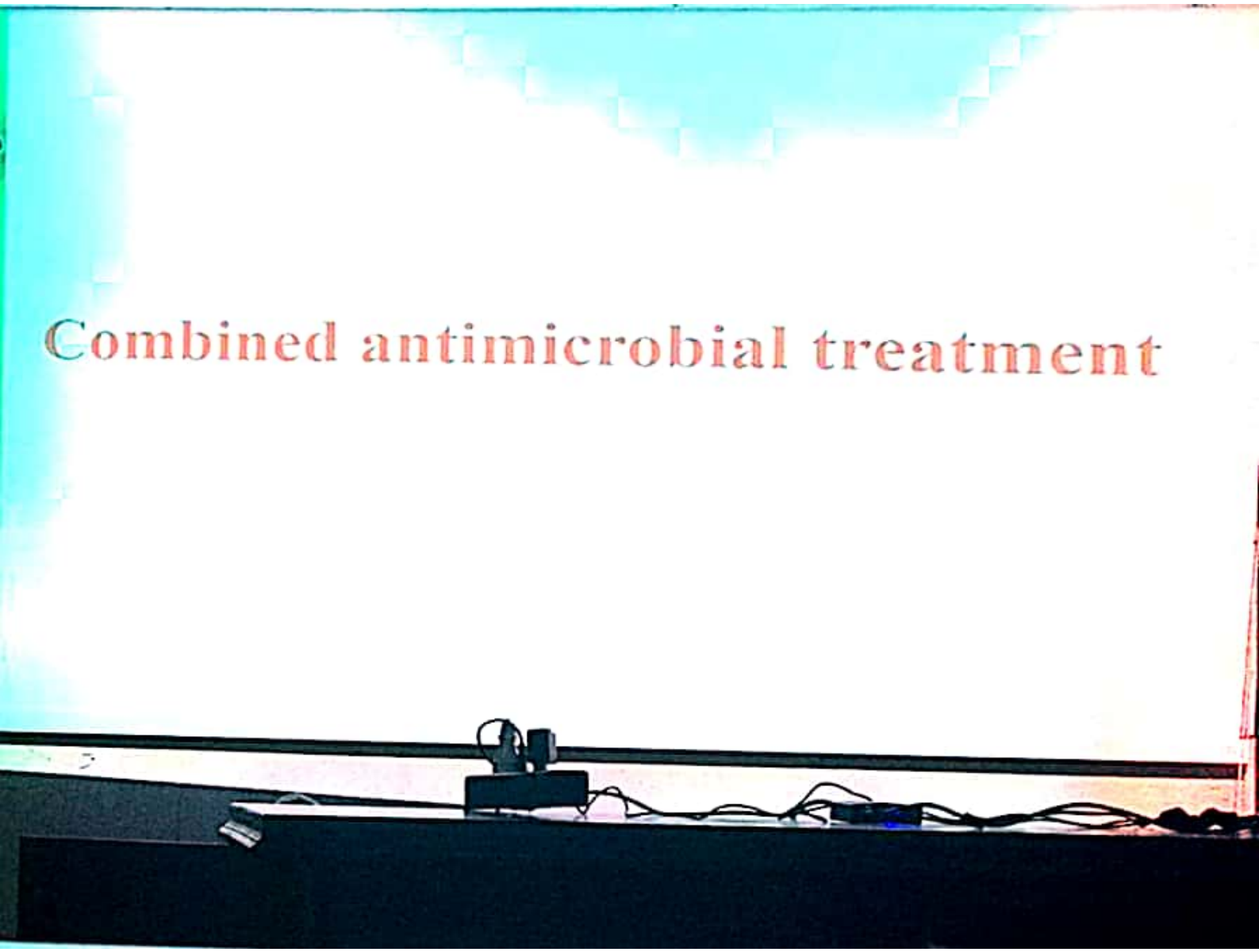
1. Has a **selective toxicity** i.e. selective inhibition of the growth of the microorganism without damage to the host.

2. Has **cidal** (lethal) rather than static (inhibit growth only) effect on micro-organisms.

3. Does not induce allergy **or hypersensitivity.**

4. Not acquire resistance from micro-organism.

5. Broad-spectrum rather than narrow-spectrum drug.



Complications of Chemotherapy

Surgical indications for prophylaxis

Prevention of subacute bacterial endocarditis:

In dental patients:

High-dose of oral amoxycillin is given to patients with congenital or rheumatic heart disease: 1h before dental extraction, manipulation, or surgery.

4. To achieve baetericidal action (synergism) e.g

One drug may prevent the inactivation of a second drug by microbial enzymes

e.g. a combination of a beta lactam antibiotic with beta lactamase inhibitor may prevent destruction of the antibiotic by β-lactamases: combination of **amoxicillin** with the enzyme inhibitor **clavulanic acid.**

Indication of drug combinations

1. **Treating a life-threatening infection:**
   e.g. bacterial meningitis in children.

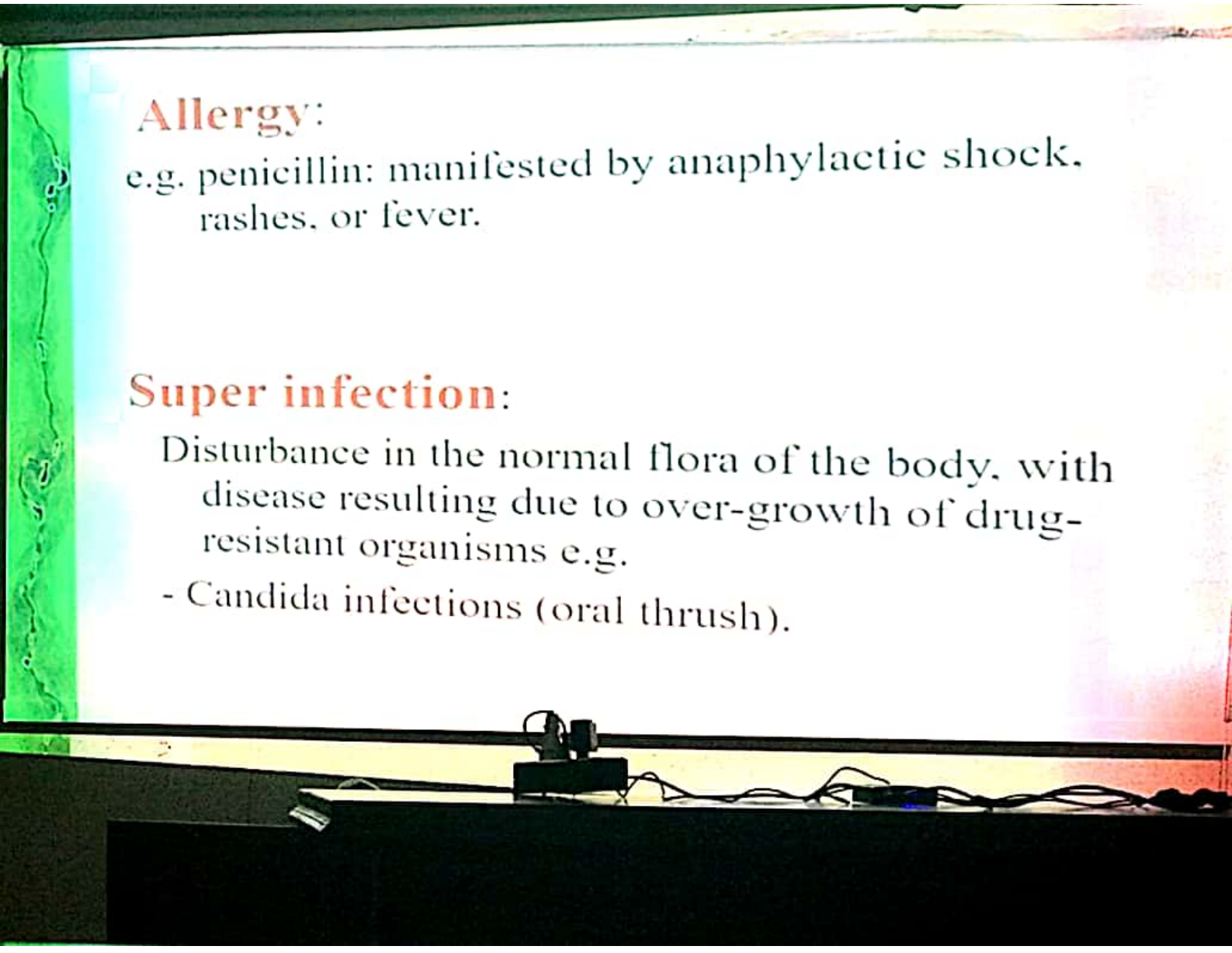
2. **To delay the emergence of microbial mutants resistant** to one drug in chronic infections by the use of a second or third non-cross-reacting drug.
   e.g. in treatment of active tuberculosis .

3. **To treat mixed infections** e.g. gingivitis

Drug toxicity

Tetracyclines:

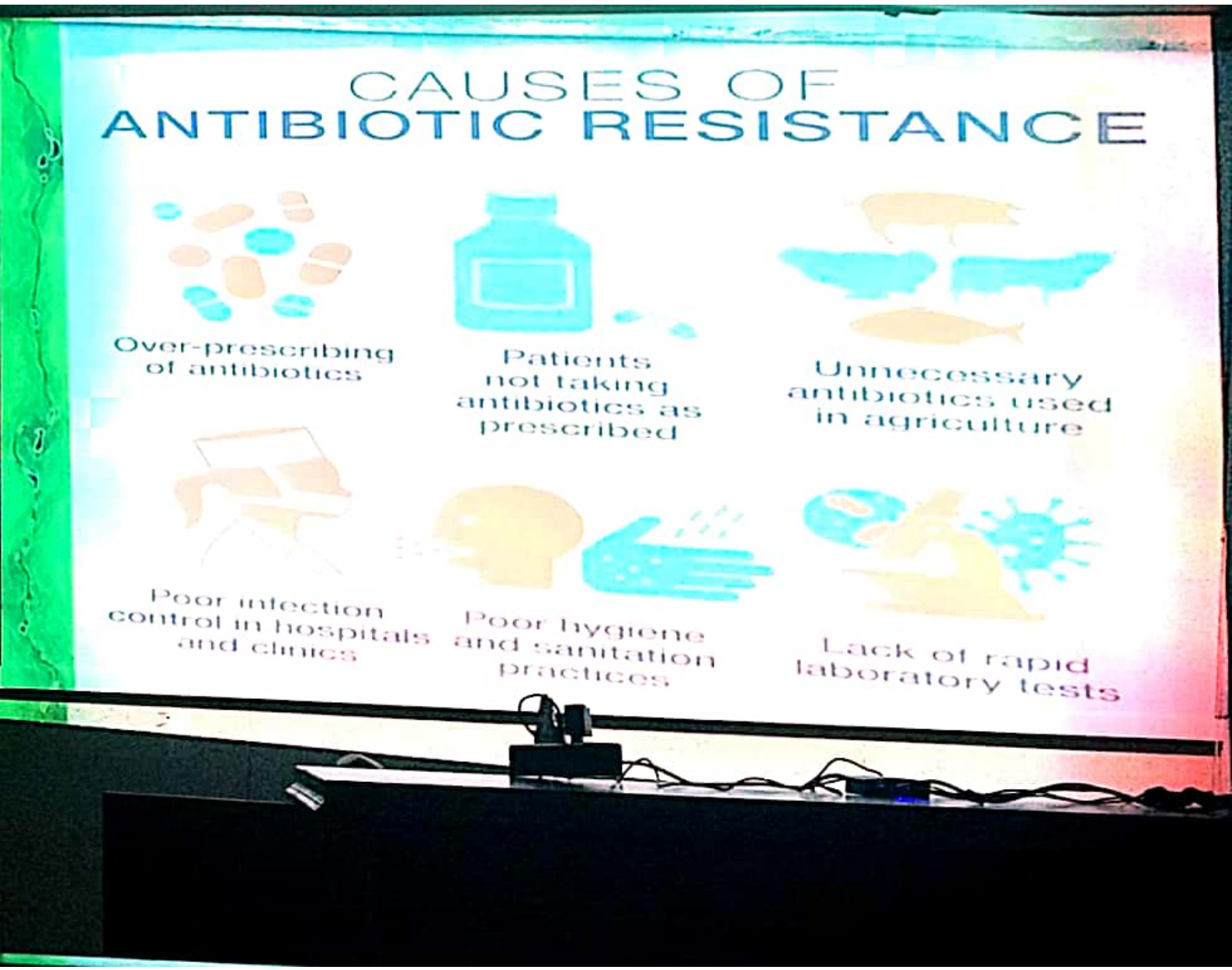
Permanent brownish staining of the teeth of fetus and young children and shortening of enamel as a result of deposition of the drug in the developing teeth. For this reason, tetracycline is contraindicated for use in pregnancy and in children younger than 8 years.



Mention the scientific term:

- Exotoxin lost toxicity but retained antigenicity.

- The ability of a pathogen to spread in the host tissues after establishing the infection



IV. Development of microbial resistance:

The resistant mutants is enhanced by:

- Use **low dose of** antibiotics.
- Use antibiotics in infections for which they are **not indicated.**
- Prescribing **unnecessarily long courses**, or **interrupted** course of antibiotic therapy.