



# PHARMACOLOGY



**Sheets**

**Slides**

**Number: 13**

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**Subject: Introduction to Antibiotics**

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- ❖ Antibiotics kill microorganisms through **differential targeting**
  - The antibiotic will target something specific in the microorganism that is not found in the human body (host)
  - Because of this “targeting”, antibiotics rarely cause toxicity (lethal effect) or side effects since they don’t target body cells.
- ❖ **Disinfectant** is a substance used to kill bacteria on non-living objects and surfaces.
  - Ex.) Phenol [usually the smell in the hospital]
  - Not used on the body
- ❖ **Antiseptics** are substances that are applied to living tissue/skin to kill bacteria
  - Ex.) Sanitizer [“hygiene”]
  - Reduces cross infection (transfer of infection; patient to doctor/patient to patient)
  - First step a physician (or anyone) does before seeing a patient is applying an antiseptic; usually on the walls of all patient rooms and halls throughout the hospital
  - Usually composed of 70% alcohol or iodine
- ❖ The body has a lot of bacteria – even more than the number of cells. Due to the immunity’s strength, there is no infection.
- ❖ If the body does get infected, it’s because the immune system can’t cope with the amount of microorganisms
- ❖ Most susceptible people to infections are **immunocompromised** patients (impaired immune system; cancer patients, AIDS, elderly)
- ❖ A patient that has an infection should first have the infection **cultured** (multiplying microbial organisms by letting them reproduce in predetermined culture media under controlled laboratory conditions)
  - Taking a culture of the infection is important because
    1. Different diseases are caused by different microorganisms
    2. The same disease can be caused by multiple microorganisms→so it is important to know the exact microorganism so it can be directly targeted
  - *Culture is important to IDENTIFY*
- ❖ The prescribed antibiotic should be the narrowest→ it’s important to pinpoint in order to specify the treatment to kill the pathogen
- ❖ In Jordan: this procedure does not happen, drugs can be prescribed without an approval of the culture being conducted.
- ❖ In the United States, United Kingdom, and Australia: on prescription forms there needs to be a sign of approval that the culture was conducted in order for antibiotic to be approved for prescription. This controls the use of antibiotics

- ❖ The exception to the rule is when the patient is in a life-death situation and needs antibiotics immediately
- ❖ Community acquired pneumonia can be caused by 6 different microorganisms
  - Culturing microorganisms can take time (about 3 days)
  - The first three days of an infection are the life-threatening days for a patient
  - So to be safe the physician should prescribe a drug to destroy all of the possible microorganisms that could have caused the infections. Choose an antibiotic that targets all possible microorganism that might cause pneumonia
  - This full coverage is dangerous because the drug used will be broad spectrum, but it is necessary
  - This is called **empirical therapy** → drugs given based on a clinical educated guess, applied before a complete perfect diagnosis
  - When the culture comes back the physician will know the exact diagnosis and pinpoint a specific drug
  - This is called **definitive therapy**; final, superior to others, can cure, can only be used after 100% sure of the diagnosis
  - **Prophylaxis therapy**: preventive treatment, to prevent infection
- ❖ Hospital acquired pneumonia is caused by microorganisms acquired while stay in the hospital, such as MRSA. The bacteria is usually different than the ones that causes community acquired pneumonia
  - Treatment will also be different for hospital acquired infections
  - Hospital acquired infections occur because of the misuse of antibiotics or by antibiotic resistant bacteria only found in hospitals.
- ❖ **Narrow spectrum**: covers either gram+ve or gram-ve (not both)
- ❖ **Broad spectrum**: covers gram+ve and gram-ve
- ❖ **Extended spectrum**: everything and includes pseudomonas
- ❖ **Superinfection**: infection occurring after or on top of an infection
  - Generally occurs when giving extended spectrum drug
  - Using the broadest drug kills normal flora and the pathogenic drug-resistant organism will increase in number due to less competition → leading to a superinfection
  - *Remember: narrow spectrum drugs are the best for antibiotics*
- ❖ There are a lot of antibiotics that are unnecessary prescriptions
  - Common cold is a viral infection, yet patients are sometimes given antibiotics and this is 100% unnecessary
  - By giving unnecessary prescriptions of antibiotics, normal flora are being killed, and allowing the antibiotic resistant microorganism to grow

- ❖ There is a myth that says if there is green mucus, take antibiotics (this is obviously false). An experiment was done by giving some patients with green mucus antibiotics, and some patients with green mucus sugar pills (control) → there was no difference. Use of antibiotics had no effects of treatment of the illness where the results of the antibiotic and sugar pills are the same. (Refer to graph in slides)