◉ Sheet ○ Slides

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Review >

بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

- Penicillin V (orally) and Penicillin G (injection) are used to treat strep throat.
- β-lactamase-resistant penicillins (**Cloxa**cillin, **Flucloxa**cilin, **Oxa**cillin) are used to treat skin infections that are caused by streptococci and staphylococci.
- **Methi**cillin also is β-lactamase-resistant penicillin (not available any more).
- MRSA = methicillin resistant staphylococcus aureus.
- Broad Spectrum Penicillins: 1- Ampicillin 2- Amoxicillin
- **Augmentin** (Amoxicillin + clavulanic acid) is used to treat upper respiratory tract infections ex: (sinusitis, otitis) that are caused either by Streptococccus, Staphylococcus, Enterococcus, or H. influenza.

<<Review is over>>

Let's start with last category of Penicillins:

☞ Extended Spectrum Penicillins

- ❖ Include **Carbeni**cillin, **Ticar**cillin, and **Pipera**cillin (most common).
- ❖ The activity is same as the broad-spectrum drugs plus pseudomonas.
- ❖ Pseudomonas aeruginosa is mostly in hospitalized patients (CCU & ICU).

Whenever we talk about Pseudomonal infection, we mostly mean hospitalized (nosocomial infections) and the most common cause for them is (MRSA & Pseudomonas aeruginosa)

⇨ We don't use **Pipera**cillin in community (only in hospitals).

These antibiotics are used in the treatments of urinary tract, lung, and bloodstream infections caused by ampicillin-resistant enteric gram negative pathogens. (ex: pseudomonas) and also used in infections that require extensive care medicine like (pneumonia, peritonitis).

****** Again, whenever we have any nosocomial infection (from hospital), we should remember Pseudomonas so keep in mind that the first thing to give are Extended Spectrum Penicillin's (Carbenicillin, Ticarcillin, and Piperacillin).**

Spectrum of Piperacillin:

Gram-positive	Gram-negative
viridans strep	*Proteus mirabilis*
Group strep	*Salmonella, Shigella*
some Enterococcus	*E. coli*
	βL- *H. influenzae*
Anaerobes	*Enterobacter sp.*
Fairly good activity	*Pseudomonas aeruginosa*
	Serratia marcescens
	some *Klebsiella sp.*

From these gram negative bacteria, pseudomonas aeruginosa is the only nosocomial bacteria.

- From all these drugs above, the most important one to know is the one that works against Pseudomonas aeruginosa (as it's hospital acquired) which is Tazocin.

➢ **Tazocin** (piperacillin + tazobactam) we use it with bacteria that produce β-lactamase like E. coli and H. influenza which are common in hospitals.

****** So, don't forget that Tazocin is used against pseudomonas, E coli and H influenza.**

****** There is no antibiotic that covers everything.**

******Penicillins are remarkably free of direct toxic effects (from the fact that they have wide therapeutic range).**

- **Unwanted effects of penicillins:**

1. The **most** unwanted side effect is **hypersensitivity reactions** which is derived from the fact that degradation products of penicillins combine with host proteins to produce haptens & become antigenic (susceptible to own Antibodies) (10% of population have penicillin allergy)

- Penicillin produce allergy reactions not from the first time, what happens exactly is that the first time our body will produce antibodies against the drug and after the second administration, we get allergic reaction (antigen-antibody reaction).

- We do skin test to know who have allergy to penicillin.
- If we don't know that is the patient have allergy or not we should avoid penicillin.
- If we give penicillin to patient with allergy to penicillins he will get what we call **(anaphylactic shock) , we treat him with adrenaline (epinephrine)** to cause bronchodilation, we can use steroids as well.

2. They cause alteration of bacterial flora in the gut and this can be associated with disturbances in the GI tract, such as Diarrhea. This happens to a greater extent when taking extended spectrum penicillins orally. (That means the greater the spectrum is, the more susceptibility to Diarrhea).

Q: WITCH OF THE FOLLOING MAY CAUSE DIARRHEA?

a. Penicillin v
b. Amoxicillin
⇨ **c. Amoxicillin + clavulanic acid**
d. Oxacillin

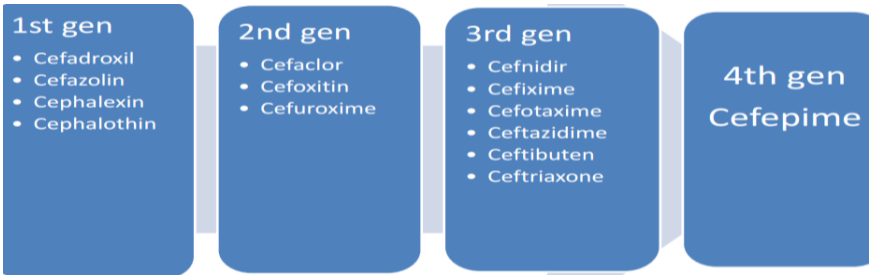
- All Penicillins, particularly Methicillin, have the potential to cause acute nephritis, thus Methicillin is no longer available.
- Antipseudomonal penicillins (Carbenicillin and Ticarcillin) and to some extent Penicillin G, may decrease agglutination.
- All oral penicillins are best given on an empty stomach to avoid the absorption delay caused by food (food cause delay) with the exception of **amoxicillin** , we can take it before or after eating. (It's absorption is not affected by food).

We have finished everything about penicillin's drug and we will move to another family of antibiotics **(Cephalosporins). and to make it easy for you to memorize them you should compare them with penicillins. so I will put a box for penicillins that what you should as a doctor know about them.

Now quick review for penicillins:

- strep throat >> Penicillin (V,G)
- strep and staph(skin infection) >> Cloxacillin, Flucloxacillin, Oxacillin
- strep, staph and H-influenza (upper respiratory tract infection) >> Augmentin
- strep, staph, H-influenza and Pseudomonas(nosocomial infection) >> Tazocin

Cephalosporins:



- Note: As we move from 1st generation to 4th generation, we gradually lose the activity on Gram positve species, but conversely, for Gram negative we gain more activity.
  - 1st > 2nd > 3rd > 4th (Gram +ve)
  - 4th > 3rd > 2nd >1st (Gram -ve)

- Note: the doctor said there is 5th generation we come and we will discuss it.
- Generations are divided depending on the period they were discovered not the spectrum they cover.

➢ **First generation:**

- **Cefazolin** (injection), **Cephalexin** (oral).
- They got very good penetration through tissues, better than penicillin G and V.
- Treat strep and staph(skin infections)like penicillinase resistant penicillins (oxacillin, cloxacillin and flucloxacillin), they also used to protect wounds from infections (prophylaxis).
- For patients who have penicillin allergy.
- A single dose of **cefazolin** is the most preferred **prophylactic agent** for procedures in which skin flora are prone to become pathogenic (1 gram IM or IV, one hour before the surgery),here we prefer the injection (Cefazolin) not oral (Cephalexin) because we want to reach high peak of activity in a shorter period of time.

Q: A patient came to the clinic and he suspected to have strep or staph infection and don't have penicillin allergy, how we treat him?

Answer: a) 1st generation Cephalosporins

b) Cloxacillin, Flucloxacilin, Oxacillin

c) more than one of the above ⇦

If the patient has allergy we only use 1st generation Cephalosporins, so the answer is "a".

➢ **Second generation:** There are 2 groups of 2nd generation cephalosporins with different activities (heterogeneity) & we categorize them them under 2nd generation because they were discovered together.

Group A) Cefuroxime (zinnat)**:**

- The spectrum of 1st gen. + H influenza**,** so we use it for upper respiratory infections(sinusitis, otitis etc…)
- Good alternative for Augmentin for those who have penicillin allergy

Group B) Cefoxitin & **Cefotetan (The cephamycins):**

- The spectrum of 1st gen. + Bacteroides fragilis group (abdominal obligate anaerobes).
- Thus used prophylactically before surgeries that include going in toward the anaerobic flora inside the abdomen.

- The cephamycins are the only 2nd generation cephalosporins that have activity against anaerobes (fragilis).

So to make it clear, if the surgery doesn't involve going inside the abdomen, then we go for 1st generation, but if we go inside the abdomen we use 2nd generation cephalosporins (Group B)

******don't forget that both generations can be used for prophylaxis.**

-Second generation cephalosporins have greater activity against three additional gram-negative organism :1- H influenza, 2-Neisseria 3- Enterobacter aerogenes. However, the activity against gram positive bacteria is weaker.

- A subset of second-generation agents (cefoxitin, cefotetan, and cefmetazole) also is active against the B. fragilis group. so can be used to treat mixed anaerobic infections such as peritonitis or diverticulitis.

- Cefuroxime is used to treat **community-acquired** pneumonia because it is active against β-lactamase-producing H influenza or K pneumonia and penicillin-resistant pneumococci.

- **Third generation:**

We said before as we moving from 1st gen. to 4th gen. we lose the activity against Gram +ve and been more active for Gram -ve. In the 3rd generation we have some drugs that has totally lost their activity for Gram +ve and others that kept their activity, so we will end up with two group:

Group A) Ceftazidime (Totally lost activity against Gram +ve and gained activity for Gram -ve):

- Not active against strep and staph anymore.
- Active against H influenza and Pseudomonas.

Group B) Cefnidir, Cefixime (Didn't totally lose activity against Gram +ve, it still has a little):

- Similar to some 2nd generation drugs, (to be more specific with **Cefuroxime** (zinnat)) because they have the same spectrum.
- So they work against strep, staph and H influenza without Pseudomonas.

That's it! I am sorry for any mistakes and good luck. #HalaMadrid <3

استيقظ....
لستَ في عالمِ وردي رأيتهُ يوماً في
أحلامك؛
قم و عش سمفونيتكَ الخاصةِ....
إعزفها كانكَ صقرٌ يخترقُ ذرات الهواء
محطماً كل شماتِ
أبى النجاح لك بل وترجى...
ضع بصمة معزوفتكَ في عالم
اختفى...
دعها تنشرُ آمالك على من ضاعَ فيها
ودنا خائفاً...
اقتدى من فاشلٍ وجدَ في قاعِ الدنيا؛
فكن أنت شمعةً،
تُعطيهم ما كنتَ تودُ يوماً....(الأمل)
.....الأمل.....الأمل.... 🕯

#بقلمي