◉Sheet ○Slides

number : 8

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Antibiotics

Attention!! It's one of the most important topics you're going to take in pharmacology.

Antibiotics in pharma are different in that of micro … here we're concerned clinically.

We should distinguish between three words:

1 – **Antibiotic**; simply, it has a *wide* therapeutic window because they have a different target from human cells... (It targets bacteria because it has different characteristics from human cells like cell walls, protein synthesis and DNA level make-up (enzymes involved in DNA make-up is different in both kind of cells))

** Antibiotics doesn't target human cell receptors but bacterial ones; thus antibiotic is free from side effects (If you open a leaflet of any drug [not an antibiotic] there's tons of side effects; because these drugs are targeting human cells' receptors. While antibiotics mostly cause diarrhea [because it kills flora bacteria in GI] or nephrotoxicity [because the antibiotic precipitate in the kidneys]

2 –**Antiseptic**; it's the usual hygiene (like Nabeel's one :D) and Iodine for operations .

3- **Disinfections**; when you go to the hospital you smell "phenol' and we use them there because hospitals are the best land for microbes.

** Most of resistant bacteria are there because when the host (which is us human beings) is immune-suppressed due to medications and we give him antibiotics→ it increases bacterial resistance… e.g. ; pseudomonas aeruginosa ; it's a hospital microorganism..

**

****Imp;** How come you have a lot of bacteria in your body and you're not infected??

A – it's all about immune system [how strong it is to suppress infection]...e.g.; if a bacteria multiplies faster than your immune system can destroy them and you'll get infected.

B – it's about giving the bacteria the opportunity to infect you [when you're stressed >> you're immune suppressed >> bacteria growth increase thus infection occurs]

****Imp:** cancer patients die from infection more than they die from cancer itself! ***Why?*** A: we give them immune suppressant medications which will increase the chance of getting an infection.

****** **Q: How do we know the microorganism that has infected us?** A: we take a culture from the suspected area of infection then identify the bacteria type to decide the antibiotic treatment (we take a biopsy and plant it on agar plate → we penetrate it and put antibiotics for identification [it's called sensitivity test]

-if we're talking about upper respiratory tract / GI infections we should think of certain number of bacteria and so on ..

Why do we want to know which bacteria is the cause of this infection? To treat it, because No antibiotic covers every single type of bacteria AND I don't want an antibiotic to kill off all kind of bacteria in my body!

** In outside countries, the GP (general doctor) is prohibited to prescribe antibiotic in most of the cases unless it's proven by the specialist that it's required.

**

Slide#3; not required for memorizing ☺ just have a look!

** If infection is in the mouth (under the teeth) we think about anaerobic bacteria (under teeth no oxygen!)

**Skin >> aerobic infection

** If an infection reaches the bones, it's disastrous!

**In GI and urinary infections, E. Coli is the main bacteria.

****Very important**: every single site in our body has specific microorganism to infect it.

Lower respiratory infection;

A – Hospital (e.g.; hospital acquired *pneumonia, pseudo-Aeruginosa*) when patient get infected in closed, crowded areas

(hospital, kinder garden, university) I should think with *hospital* acquired bacteria (listed in slide 3 not for memorizing) which is more serious and dangerous!

B- Community (e.g.; community acquired pneumonia)

** Influenza is viral infection in most cases (influenza A, B) , or bacterial infection sometimes (H. influenza).

**

Antibacterial chemotherapy divided into;

1 –***narrow spectrum***; it covers either gram positive or negative (one or limited group of microorganism) e.g.; *Vancomycin* (for gram positive) and *Azithrosan* (for gram negative)…[The doctor said it's not a problem not to know them and he didn't mention if they are required or not]

2 – ***broad (wide) spectrum***; kills gram positive and some of gram negative (combination of two narrow drugs one kills gram positive and the other kills gram negative) .. e.g.; Augmentin ..

3 – ***extended spectrum***; it covers gram positive and gram negative and **MRSA bacteria** and **pseudomonas**.

**

Superinfection; when administration of antibiotic >> it kills normal flora in our body >> pathogenic microorganism which are opportunistic increase in number due to absence of competition.

**There are 10^12 bacteria in GIT :O! Microorganisms in our body are in competition for nutrients

*If you take narrow spectrum; decrease the 10^12 bacteria (not a sharp decrease because it's a narrow spectrum which is against specific type of bacteria)

*If you take board >> more will die

*If you take extended spectrum >> more and more will die >> decrease the number of bacteria thus amount of nutrients for the rest resistant bacteria will increase >> more susceptibility for pathogens to replicate because of nutrients abundance and it will overcome immune system.

**The stronger the antibiotic against more number of microorganism the more chance it is to have superinfection >> the more resistant microorganism will occupy your body.

** The more antibiotic you take >> the more you lose competition >> the more deteriorated your health will be.

** The main side effect of antibiotics is diarrhea WHY? Because we interact with the microflora in GIT >> disturbance in it ... antibiotics doesn't change GI motility (they don't act on human cells) but it disturbs the flora.

**Superinfection can be caused by things other than bacteria…e.g. *fungi* are highly competent with bacteria... *Viruses* are less competent with bacteria.

E.g.; administration of broad spectrum antibacterial drug can select the overgrowth of fungi [yeast mostly] causing **genus candida**

**

Antibiotic misuse;

1 – saving antibiotics for future use

2 – share and use someone else's medications

3 – when needed → people take it incorrectly [stop medication when they feel better, not finishing the prescription]

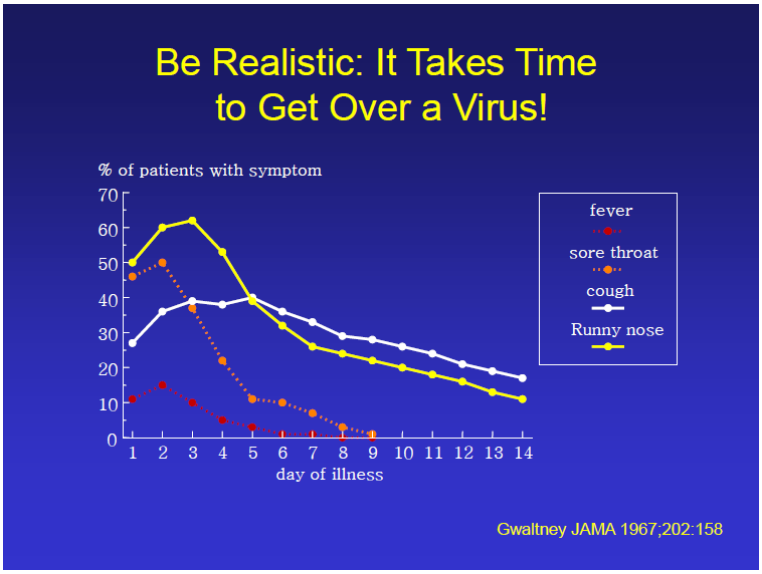
4 – taking it when it's **not needed;** e.g.; viral infection [e.g.; common cold is caused by viruses >> antibiotics can't work on them]

Some doctors prescribe antibiotics in viral infections concerning about secondary infection, but that's not right because 2ndary infection is rare.

Slide#11; the coarse of most viral infection

Symptoms: runny nose, fever, sore throat, cough.

*They peak (appearance of symptoms) between second and third day with/without antibiotics... they will drop sharply by the third day (this is the nature of viral infection)…whether you take antibiotics or not >> the same coarse.



Unfortunately , ignorance of such researches- that say " antibiotics don't affect viruses " – come from community and doctors

Slide#12; *Green/yellow mucus myth* >> it's always a viral infection. bacterial infections are clear in symptoms includes : tonsillitis , fever , fatigue … but in viral infections you still strong and active

We studied 100 patient giving them antibiotic or sugar pills >> there was no effect of antibiotic on the mucus .

the doctor mentions a saying that goes: “if you take an antibiotic it will take one week, and if you don’t it will also take one week!” So don’t consider a pill for every ill ;)

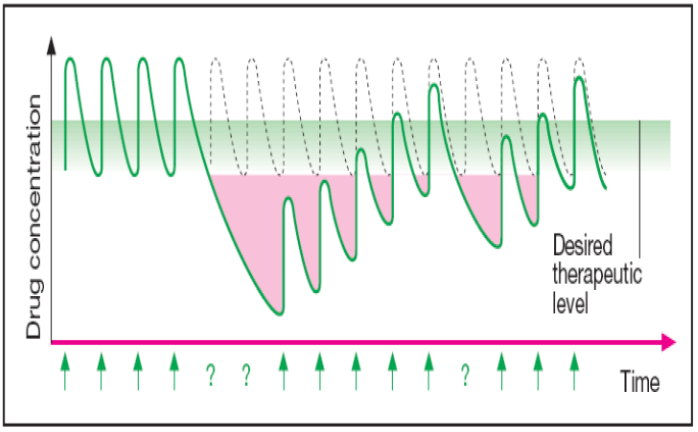
Why is Antibiotic Misuse a Problem?

(1) Antibiotics become less effective and may not work the next time you use them. Simply because bacteria will become resistant.

(2) Improper use of antibiotics leads to more antibiotic resistant bacteria.

(3) Antibiotic resistant bacteria can be spread throughout the community and from person to person.

We see here irregular intake of drugs – such in Jordanian patients ☺- which will give only subtherapeutic effect then it kill good bacteria and keep bad/dominant ones.



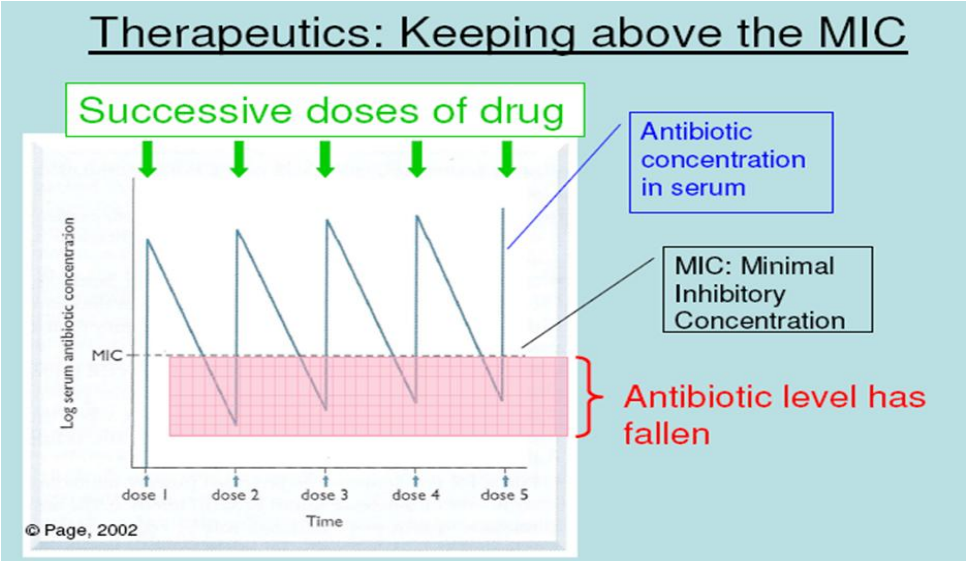
Time course of drug concentration with irregular intake

This case is an example of toxicity or side effects caused by subtherapeutic doses!

So we need to keep the antibiotic doses above the MIC (minimal inhibitory concentration) which is the minimum concentration needed to inhibit bacteria .

- most of these antibiotics have a half life between 2 and 3 hours so we need to dose them normally 3 times a day.

- in most of cases , we give doses 8 times more than the MIC which means we have wide therapeutic windows for these antibiotics .



****Sometimes if you really want to do good things in life then balance isn't the way to go, sometimes you got to make sacrifices…**