Chemotherapy

- Sulphonamides
  - Cotrimoxazole–trimethoprim(no) (Bactrim, Septrin,Balakatrin)
    - Very useful in UTI, RTI, Salmonella, and Pneumocystis pneumonia, and opportunistic infection in AIDS
    - Prevents synthesis of folic acid from PABA
- Quinolones
  - Interfere with cell division of bacteria.

    by inhibiting topoisomerase 4 & DNA gyrase
    - Nalidixic Acid
      - Very old urinary antiseptic
    - Norfloxacin
      - Used only for UTI+ 3–day course
    - fluorinated 4–quinolones
      - ciprofloxacin (CIPRO)
        - Wide range of activity
        - Prophylaxis for meningitis
        - Very efficient and expensive
        - Bad news, it can cause Gi upset and epilepsy
      - moxifloxacin (AVELOX)
      - gatifloxacin (TEQUIN)
- Nitrofurans(nitrofurantoin)
  - Modify bacterial macromolecules that affect biochemical processes .
  - Used in treatmnet and prophylaxis of microbial infections, primarily in the urinary tract
    - Lower UTI
    - Not a bacterial supressant
    - used prophylactically post intercourse in women with chronic UTIs
  - Nitrofurans affect biochemical process that is shared between humans and bacteria , but the slower reduction by mammalian cells prevents high serum conc.
  - Active mainly against –ve bacteria (E.coli&P. mirabilis)
    it can affect +ve bacteria(S. aureus& Enterococcus faecalis)
  - Development of resistance is unknown and there is no cross–resistance cases reported
  - Its activity depends on its conc. And it may cause nausea and vomiting
- Methenamine (aromatic acid)
  - Hydrolyzed at ph lower than 6 into ammonia & formaldehyde(active alkylating agent)
    - Formaldehyde denatures proteins (bactericidal)
    - Ammonia will be distributed to every bodyfluid
  - Administered orally as a salt (examples; mandelic &hippuric acid)
    - Acidify the urine generating formaldehyde(cidal)
      also it lowers the ph(static)
  - Well absorbed in the intestine but some of it will be decomposed in the stomach(unless they’re protected)
  - Used as a long–term prophylactic or suppressive therapy of recurring UTIs
    - Used as sterilizer after the treatment of a bacterial infection in the urine .
- Beta–lactam antibiotic
  - Contains beta lactam ring
    - Responsible for its activity
      - Inhibits cell wall synthesis(cidal)
    - Some bacteria developed resistance by producing lactamase
  - Penicillin G is the prototype
  - Oldest antibiotics but still growing
- the Penicillins
  - Produced by the fermentation of a medium that is used to culture pencillium
  - Can be used directly in clinical situations(penicillin G is the only natural one used clinically)
  - Penicillin G is effective against +ve bacteria
  - We can apply some modification on them to solve the resistance problem , be adding side chains or by drug combination
  - Ex. on drug combination;
    augmentin—> clavulanic acid + amoxicillin
  - Penicillinase—> inactivates penicillin by breaking beta lactam ring
  - Amidase—> breaks penicillin into carboxylate and 6–aminopenicillinate
  - It inhibits the last step in peptidoglycan synthesis by penicillin–binding proteins which are on the surface of bacteria and have affinity toward penicillin
  - Beta lactamase inhibitors
    - Clavulanic acid
    - Sulbactam
    - Tazobactam
  - Important examples about penicillin
    - Benzyl penicillin(penicillin G)
      - Highly active against +ve cocci
      - Hydrolyzed by penicillinase
      - Ineffective against S.aureus
      - IM injection
    - Procain benzylpenicillin
      - Painless & prolonged action
      - IM injection
    - Phenoxymethyl penicillin
      - Given orally and cant be destroyed by gastric juice
    - Cloxacillin, Dicloxacillin, and Fluclocillin
      - Penicillinase resistant
      - Against staphylococcus