antibiotics for pediatrics
Objectives

- Identify the common antibiotics used for treatment of pediatric infections
- Differentiate between viral and bacterial infections
- Plan for management of common infections
Children, infections and antibiotics

Hmm... I feel sick, do I need antibiotics?
Antibiotic prescription should ideally comprise of the following phases:

- is an antibiotic necessary?
- which is the most appropriate antibiotic?
- What dose, route, frequency and duration are needed?
- is the antibiotic effective?
What is our current practice?

Commonest reasons for antimicrobial drug use among children in office practice are:

- Nonspecific upper respiratory tract infections including Pharyngotonsillitis,
- Otitis media,
- Diarrhea
- Fever without focus

Most of the time these antimicrobials are often unwarranted
Choice of Antibiotics

The choice of antibiotics should largely be determined by:

- source or focus of infection
- patient's age and immunologic status
- whether the infection is viral or bacterial
- is it community acquired or nosocomial

In office practice usual infections are community acquired
Case 1:

1 yr and 6 months old male,

- Brought with history of fever and cough with rhinorrhea of two days
- red eyes,
- diarrhea,
- No exanthema,
- cough +
- + Similar case in family
- Throat congested

How will you manage?

Your thoughts..............
2nd Case

4 year old boy brought to your clinic with 2 days history of high spiking fever and mild cough

From history and examination:
- Has no red eyes or rhinorrhea
- No exanthema
- Difficulty in swallowing,
- No history of similar case in the family
- He looks sick even when a febrile
on examination……

- RR 28, HR 110
- perfusion and B.P normal
- Rt tonsil showed a purulent discharge with inflammation of both tonsils
- Bilateral tender cervical LN++
- Ear and Nose – Normal
- Other system examination – normal

How will you manage?......
what is the difference?

case 1
○ Acute onset, Red eyes, rhinorrhea, cough++, diarrhea
○ No rashes
○ Pharyngeal congestion but no or scanty exudates and no cervical lymphadenopathy
○ Age less than 3 years

Most probably viral

case 2
○ Acute onset, throat pain, rapid progression, very little cough/cold
○ Pharyngeal congestion more, thick exudates or follicles, purulent patchy lesions on tonsils with tender enlarged LN
○ Toxicity ++
○ Age more than 3 years

Most probably bacterial
Viral vs Bacterial

Signs with good predictive values
- Presence of watery nasal discharge
- Absence of pharyngeal erythema
- Absence of tonsillar exudate or follicles
- Absence of tender lymphadenopathy
- Involvement of multiple systems
- Generalized maculopapular rashes
- H/o similar illness in family or community

Suggest Viral Pharyngotonsillitis
- More of these, better the predictability
- No single sign is definitive
- Age less than 3 years – more chance of viral
Case 3

- a 15 month old otherwise healthy girl had rhinorrhea, cough and fever of 39˚c for two days

- On day 3, she became irritable and woke up crying multiple times at night

WHAT COULD BE WRONG?
HOW DOES ONE EVALUATE THIS CHILD?
she HAS ACUTE OTITIS MEDIA RIGHT EAR

On examination of Rt ear:
- Erythema
- Fluid
- Impaired mobility
- Acute symptoms
- MANAGEMENT?
- Analgesia
  - Paracetamol in adequate doses as good as Ibuprofen
- **Antibiotics** in divided doses for **10 days**
  - Choice - **first line Amoxycillin / Co-amoxyclov**
  - **Second line**
    - Second generation cephalosporins e.g. Cefaclor, cefuroxime.
    - Co amoxyclav – if not used earlier
Case 4

- 10 month old boy
- Illness 2 days
- Started with vomiting 6-7/day
- Fever
- Frequency of stool 12-15/day, watery, large quantity
- On Weaning diet
- Ill look
- Depressed AF
- Dry skin and mucous membrane
- Sunken eyeballs
- Rapid, low volume pulse

How will you manage?
Child with Acute Diarrhea

- Watery Diarrhea without blood in stool
- Diarrhea with macroscopic blood in stool
- Diarrhea with Systemic infection

Assess dehydration

- Severe dehydration
  - IV fluids
  - ORS (10)
  - Zinc (11)
  - Continued frequent feeding - including BF

- Mild to moderate dehydration
  - ORS (10)
  - Zinc (11)
  - Continued frequent feeding - including BF

Pallor, Purpura, Oliguria

Hospitalise

No antibiotics
Child with Acute Diarrhea

Watery Diarrhea
without blood in stool

Diarrhea with
macroscopic blood in stool

Diarrhea with
Systemic infection

Rule out risk factors &
noninfectious conditions

Treat with 3rd Gen
Oral Cephalosporins
ORS to treat &
prevent dehydration
Zinc
continued frequent
feeding including BF

Better in 2 days?*

No

Yes

2nd line drugs:
ciprofloxacin /ceftriaxone

Complete 3 days
 treatment

Response in 2 days? **

No

Yes

Look for
trophozoites of
E. histolytica in
stools

Absent

Present

Treat with
Metronidazole

Antibiotics for
infection
ORS
Zinc
Continued
frequent feeding
including BF

Hospitalise

** Disappearance of fever,
less blood in stools - fewer
in no, improved appetite,
decreased abdominal
pain, return to normal
activity indicate good
response.
# Recommendations for Antibiotic selection

<table>
<thead>
<tr>
<th>Conditions</th>
<th>First line drugs</th>
<th>Second line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharyngotonsillitis</td>
<td>Penicillin/1(^{st}) gen ceph</td>
<td>Amoxycillin/ Macrolides</td>
</tr>
<tr>
<td>Otitis/Sinusitis</td>
<td>Amoxycillin</td>
<td>Co-amoxyclylav/ 2nd gen ceph/Macrolides</td>
</tr>
<tr>
<td>Pneumonia (CA)</td>
<td>High dose Amoxy/ 2nd/3rd gen Inj ceph</td>
<td>3rd gen inj ceph/ Fluoroquinolones</td>
</tr>
<tr>
<td>Enteric fever</td>
<td>3rd gen oral ceph</td>
<td>3rd gen inj ceph/ Fluoroquinolones</td>
</tr>
<tr>
<td>Dysentery</td>
<td>Norflox/3rd gen oral ceph</td>
<td>2nd gen quinolones/ Ceftriaxone</td>
</tr>
<tr>
<td>UTI</td>
<td>Sulpha/Trimetho/ Co-amoy/3rd gen oral ceph</td>
<td>Fluoroquinolones/ Aminoglycosides</td>
</tr>
</tbody>
</table>
Antibiotic classification

- Aminoglycosides
- Glycopeptides
- Beta Lactams
  - Penicillins
  - Carbapenems
  - Cephalosporins
- Floroquinolones
- Oxazolidinones
- Lincosamides
- Macrolides
- Miscellaneous
<table>
<thead>
<tr>
<th>PENICILLINS</th>
<th>CEPHALOSPORINS</th>
<th>FLUOROQUINOLONES</th>
<th>AMINOGLYCOSIDES</th>
<th>MONOBACTAMS</th>
<th>CARBAPENEMS</th>
<th>MACROLIDES</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natrual</td>
<td>First generation</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Penicillin G</td>
<td>Cephalothin</td>
<td>Ciprofloxacin</td>
<td>Amikacin</td>
<td>Aztreonam</td>
<td>Ertapenem</td>
<td>Azithromycin</td>
<td>Vancomycin</td>
</tr>
<tr>
<td>Penicillin-VK</td>
<td>Cefazolin (Ancef, Kefzol)</td>
<td>Levofloxacin</td>
<td>Gentamicin</td>
<td>Meropenem</td>
<td>Clarithromycin</td>
<td>Clarithromycin</td>
<td>Doxycycline</td>
</tr>
<tr>
<td></td>
<td>Cephapirin</td>
<td>Moxifloxacin</td>
<td>Kanamycin</td>
<td>Aztreonam</td>
<td>Dirithromycin</td>
<td>Dirithromycin</td>
<td>Linezolid</td>
</tr>
<tr>
<td></td>
<td>Cephalexin (Keflex)</td>
<td>(Avelox)</td>
<td>Neomycin</td>
<td>Meropenem</td>
<td>Erythromycin</td>
<td>Erythromycin</td>
<td>Tetracycline</td>
</tr>
<tr>
<td></td>
<td>other</td>
<td>Norfloxacin</td>
<td>Tobramycin</td>
<td>Meropenem</td>
<td>Clindamycin</td>
<td>Clindamycin</td>
<td>Trimethoprim</td>
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<td></td>
<td></td>
<td></td>
<td>sulfamethoxacol</td>
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<tr>
<td>Penicillinase Resistant</td>
<td>Second Generation</td>
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<tr>
<td>Methicillin</td>
<td>Cefacor</td>
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<tr>
<td>Nafcillin</td>
<td>Cefotetan (Cefotan)</td>
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<tr>
<td>Oxacillin</td>
<td>other</td>
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<tr>
<td>Aminopenicillins</td>
<td>Third Generation</td>
<td></td>
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<tr>
<td>Ampicillin</td>
<td>Ceftriaxone</td>
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<tr>
<td></td>
<td>(Rocephin)</td>
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<td></td>
<td>other</td>
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<td></td>
<td>Fourth Generation</td>
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<tr>
<td></td>
<td>Cefpirome</td>
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<td></td>
<td>Cefepime</td>
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</tr>
</tbody>
</table>

- **Penicillins**: Natural or Penicillin G, Penicillin-VK
- **Cephalosporins**: Cephalothin, Cefazolin (Ancef, Kefzol), Cephapirin, Cephalexin (Keflex), other
- **Fluoroquinolones**: Ciprofloxacin (Cipro), Levofloxacin (Levaguin), Moxifloxacin (Avelox), Norfloxacin
- **Aminoglycosides**: Amikacin, Gentamicin, Kanamycin, Neomycin, Tobramycin
- **Monobactams**: Aztreonam
- **Carbapenems**: Ertapenem, Meropenem
- **Macrolides**: Azithromycin, Clarithromycin, Dirithromycin, Erythromycin
- **Other**: Vancomycin, Clarithromycin, Rifampin, Doxycycline, Erythromycin, Tetracycline, Clindamycin, Trimethoprim, sulfamethoxacol
# Penicillins

Penicillins inhibit cell wall synthesis by blocking cross linking via competitive inhibition of the transpeptidase enzyme. They are bactericidal.

<table>
<thead>
<tr>
<th>Class/Mechanism</th>
<th>Drugs</th>
<th>Indications (<strong>Drug of Choice)</strong></th>
<th>Toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Penicillin</strong></td>
<td>Penicillin G</td>
<td><em>Strep. pyogenes</em> (Grp.A)**</td>
<td>Hypersensitivity reaction</td>
</tr>
<tr>
<td></td>
<td>Aqueous penicillin G</td>
<td></td>
<td>Hemolytic anemia</td>
</tr>
<tr>
<td></td>
<td>Procaine penicillin G</td>
<td><em>Step. agalactiae</em> (Grp.B)**</td>
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</tr>
<tr>
<td></td>
<td>Benzathine penicillin G</td>
<td><em>C. perfringens</em> (Bacilli)**</td>
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</tr>
<tr>
<td></td>
<td>Penicillin V</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Aminopenicillins</strong></td>
<td>Ampicillin</td>
<td>Above +</td>
<td>Above</td>
</tr>
<tr>
<td></td>
<td>Amoxicillin</td>
<td>↑ Gram-negative:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>E. faecalis</em>*</td>
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<tr>
<td></td>
<td></td>
<td><em>E. Coli</em>*</td>
<td></td>
</tr>
<tr>
<td><strong>Penicillinase-resistant-penicillins</strong></td>
<td>Methicillin</td>
<td>Above +</td>
<td>Above +</td>
</tr>
<tr>
<td></td>
<td>Nafcillin</td>
<td><em>Staph. aureus</em></td>
<td>Interstitial nephritis</td>
</tr>
<tr>
<td></td>
<td>Oxacillin</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cloxacillin</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Dicloxacillin</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Antipseudomonal penicillins</strong></td>
<td>Carbenicillin</td>
<td><em>Above + Pseudomonas</em> aeruginosa**</td>
<td>Above</td>
</tr>
<tr>
<td></td>
<td>Ticarcillin</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Piperacillin</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Cephalosporins

(bactericidal: inhibits bacterial cell wall synthesis via competitive inhibition of the transpeptidase enzyme)

<table>
<thead>
<tr>
<th>1st generation</th>
<th>Cefazolin</th>
<th><strong>Staph. aureus</strong>&lt;sup&gt;**&lt;/sup&gt;</th>
<th>Allergic reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cephalexin</td>
<td><strong>Staph. epidermidis</strong>&lt;sup&gt;**&lt;/sup&gt;</td>
<td>Coombs-positive anemia (3%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Some Gram-negatives:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>E. Coli</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Klebsiella</em></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2nd generation</th>
<th>Cefoxitin</th>
<th>Above +</th>
<th>Allergic Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cefaclor</td>
<td>↑ Gram-negative</td>
<td>ETOH Disulfiram reaction</td>
</tr>
<tr>
<td></td>
<td>Cefuroxime</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3rd generation</th>
<th>Ceftriaxone</th>
<th>Above +</th>
<th>Allergic Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cefotaxime</td>
<td>↑ Gram-negative</td>
<td>ETOH Disulfiram reaction</td>
</tr>
<tr>
<td></td>
<td>Ceftazidime</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cefepime (4th generation)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Other Cell Wall Inhibitors

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Activity Against Gram-Positive and Gram-Negative Bacteria</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vancomycin</strong></td>
<td>MRSA**, PCN/Ceph allergies**</td>
<td>Red man syndrome, Nephrotoxicity, Ototoxicity</td>
</tr>
<tr>
<td>(bactericidal: disrupts peptidoglycan cross-linkage)</td>
<td><em>S. aureus</em>, <em>S. epidermidis</em></td>
<td></td>
</tr>
<tr>
<td><strong>Beta-lactamase Inhibitors</strong></td>
<td><strong>S aureus</strong>, <strong>S epidermis</strong>, <strong>E.Coli</strong>, <strong>Klebsiella</strong></td>
<td>Hypersensitivity Reaction, Hemolytic anemia</td>
</tr>
<tr>
<td>(bactericidal: blocking cross linking)</td>
<td><em>S. aureus</em>, <em>S epidermis</em>, <em>E.Coli</em>, <em>Klebsiella</em></td>
<td></td>
</tr>
<tr>
<td><strong>Carbapenems</strong></td>
<td>Broadest activity of any antibiotic (except MRSA, Mycoplasma)</td>
<td></td>
</tr>
<tr>
<td>Imipenem (+ cilastatin)</td>
<td><em>S. aureus</em>, <em>S. epidermidis</em>, <em>E.Coli</em>, <em>Klebsiella</em></td>
<td></td>
</tr>
<tr>
<td>Meropenem</td>
<td><em>S. aureus</em>, <em>S. epidermidis</em>, <em>E.Coli</em>, <em>Klebsiella</em></td>
<td></td>
</tr>
<tr>
<td>Doripenem</td>
<td><em>S. aureus</em>, <em>S. epidermidis</em>, <em>E.Coli</em>, <em>Klebsiella</em></td>
<td></td>
</tr>
<tr>
<td>Ertapenem</td>
<td><em>S. aureus</em>, <em>S. epidermidis</em>, <em>E.Coli</em>, <em>Klebsiella</em></td>
<td></td>
</tr>
<tr>
<td><strong>Aztreonam</strong></td>
<td>Gram-negative rods Aerobes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hospital-acquired infections</td>
<td></td>
</tr>
<tr>
<td><strong>Polymyxins</strong></td>
<td>Topical Gram-negative infections</td>
<td></td>
</tr>
<tr>
<td>Polymyxin B</td>
<td><em>S. aureus</em>, <em>S. epidermidis</em>, <em>E.Coli</em>, <em>Klebsiella</em></td>
<td></td>
</tr>
<tr>
<td>Polymyxin E</td>
<td><em>S. aureus</em>, <em>S. epidermidis</em>, <em>E.Coli</em>, <em>Klebsiella</em></td>
<td></td>
</tr>
<tr>
<td><strong>Bacitracin</strong></td>
<td>Topical Gram-positive infections</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>S. aureus</em>, <em>S. epidermidis</em>, <em>E.Coli</em>, <em>Klebsiella</em></td>
<td></td>
</tr>
</tbody>
</table>
### Protein Synthesis Inhibition

**Anti-30S ribosomal subunit**

<table>
<thead>
<tr>
<th>Aminoglycosides (bactericidal: irreversible binding to 30S)</th>
<th>Gentamicin</th>
<th>Neomycin</th>
<th>Amikacin</th>
<th>Tobramycin</th>
<th>Streptomycin</th>
<th>Aerobic Gram-negatives</th>
<th>Enterobacteriaceae</th>
<th>Pseudomonas</th>
<th>Nephrotoxicity</th>
<th>Ototoxicity</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Tetracyclines (bacteriostatic: blocks tRNA)</th>
<th>Tetracycline</th>
<th>Doxycycline</th>
<th>Minocycline</th>
<th>Demeclocycline</th>
<th>Rickettsia</th>
<th>Mycoplasma</th>
<th>Spirochetes (Lyme's disease)</th>
<th>Hepatotoxicity</th>
<th>Tooth discoloration</th>
<th>Impaired growth</th>
<th>Avoid in children &lt; 12 years of age</th>
</tr>
</thead>
</table>
### Anti-50S ribosomal subunit

<table>
<thead>
<tr>
<th>Class</th>
<th>Antibiotics</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Macrolides</strong></td>
<td>Erythromycin</td>
<td><em>Streptococcus</em></td>
</tr>
<tr>
<td><em>bacteriostatic: reversibly</em></td>
<td>Azithromycin</td>
<td><em>H. influenzae</em></td>
</tr>
<tr>
<td><em>binds 50S</em></td>
<td>Clarithromycin</td>
<td><em>Mycoplasma pneumonia</em></td>
</tr>
<tr>
<td><strong>Chloramphenicol</strong></td>
<td>Chloramphenicol</td>
<td><em>H. influenzae</em></td>
</tr>
<tr>
<td><em>bacteriostatic</em></td>
<td></td>
<td>Bacterial Meningitis</td>
</tr>
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<td></td>
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<td>Brain abscess</td>
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<td></td>
<td></td>
<td>Gray Baby Syndrome</td>
</tr>
<tr>
<td><strong>Lincosamide</strong></td>
<td>Clindamycin</td>
<td><em>Bacteroides fragilis</em></td>
</tr>
<tr>
<td><em>bacteriostatic:</em></td>
<td></td>
<td><em>S. aureus</em></td>
</tr>
<tr>
<td><em>inhibits peptidyl</em></td>
<td></td>
<td><em>Coagulase-negative Staph &amp; Strep</em></td>
</tr>
<tr>
<td><em>transferase by interfering</em></td>
<td></td>
<td>Excellent Bone Penetration</td>
</tr>
<tr>
<td><em>with amino acyl-tRNA</em></td>
<td></td>
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<tr>
<td><em>complex</em></td>
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</tr>
<tr>
<td><strong>Linezolid</strong></td>
<td>Linezolid</td>
<td>Resistant Gram-positives</td>
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<tr>
<td><em>(variable)</em></td>
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</tr>
<tr>
<td><strong>Streptogramins</strong></td>
<td>Quinupristin</td>
<td>VRE</td>
</tr>
<tr>
<td></td>
<td>Dalfopristin</td>
<td>GAS and S. aureus skin infections</td>
</tr>
</tbody>
</table>
### DNA Synthesis Inhibitors

**Fluoroquinolones**
(bactericidal: inhibit DNA gyrase enzyme, inhibiting DNA synthesis)

<table>
<thead>
<tr>
<th>Generation</th>
<th>药物</th>
<th>细菌</th>
<th>药物毒性</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st generation</td>
<td>Nalidixic acid</td>
<td><em>Steptococcus</em></td>
<td>Phototoxicity</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Mycoplasma</em></td>
<td>Achilles tendon rupture</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Aerobic Gram +</em></td>
<td>Impaired fracture healing</td>
</tr>
<tr>
<td>2nd generation</td>
<td>Ciprofloxacin</td>
<td>As Above</td>
<td>as above</td>
</tr>
<tr>
<td></td>
<td>Norfloxacin</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enoxacin</td>
<td>+<em>Pseudomonas</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ofloxacin</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Levofloxacin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd generation</td>
<td>Gatifloxacin</td>
<td>As above + Gram-positives</td>
<td>as above</td>
</tr>
<tr>
<td>4th generation</td>
<td>Moxifloxacin</td>
<td>As above + Gram-positives + anaerobes</td>
<td>as above</td>
</tr>
</tbody>
</table>
## Other DNA Inhibitors

| Other DNA Inhibitors | Metronidazole | Anaerobics | Seizures
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metronidazole</strong></td>
<td>(bacteridical: metabolic biproducts disrupt DNA)</td>
<td><strong>Flagyl</strong></td>
<td>Crebelar dysfunction \ ETOH disulfram reaction</td>
</tr>
</tbody>
</table>

## RNA Synthesis Inhibitors

<table>
<thead>
<tr>
<th>RNA Synthesis Inhibitors</th>
<th>Rifampin</th>
<th>RNA Transcription Inhibitor</th>
<th>Body fluid discoloration \ Hepatotoxicity (with INH)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rifampin</strong></td>
<td></td>
<td><strong>Staphylococcus</strong> \ <strong>Mycobacterium</strong> (TB)</td>
<td>Body fluid discoloration Hepatotoxicity (with INH)</td>
</tr>
</tbody>
</table>

## Mycolic Acids Synthesis Inhibitors

<table>
<thead>
<tr>
<th>Mycolic Acids Synthesis Inhibitors</th>
<th>Isoniazid</th>
<th>TB</th>
<th>Latent TB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Isoniazid</strong></td>
<td></td>
<td>TB</td>
<td>Latent TB</td>
</tr>
</tbody>
</table>

## Folic acid Synthesis Inhibitors

| Folic acid Synthesis Inhibitors | Trimethoprim/Sulfonamides | UTI organisms | Thrombocytopenia
|---------------------------------|----------------------------|---------------|-----------------|
| **Trimethoprim/Sulfonamides**   | Trimethoprim/Sulfamethoxazole (SMX) \ Sulfisoxazole \ Sulfadiazine | **Proteus** \ **Enterobacter** | Thrombocytopenia
|                                |                            |               | Avoid in third trimester of pregnancy |
Thank You