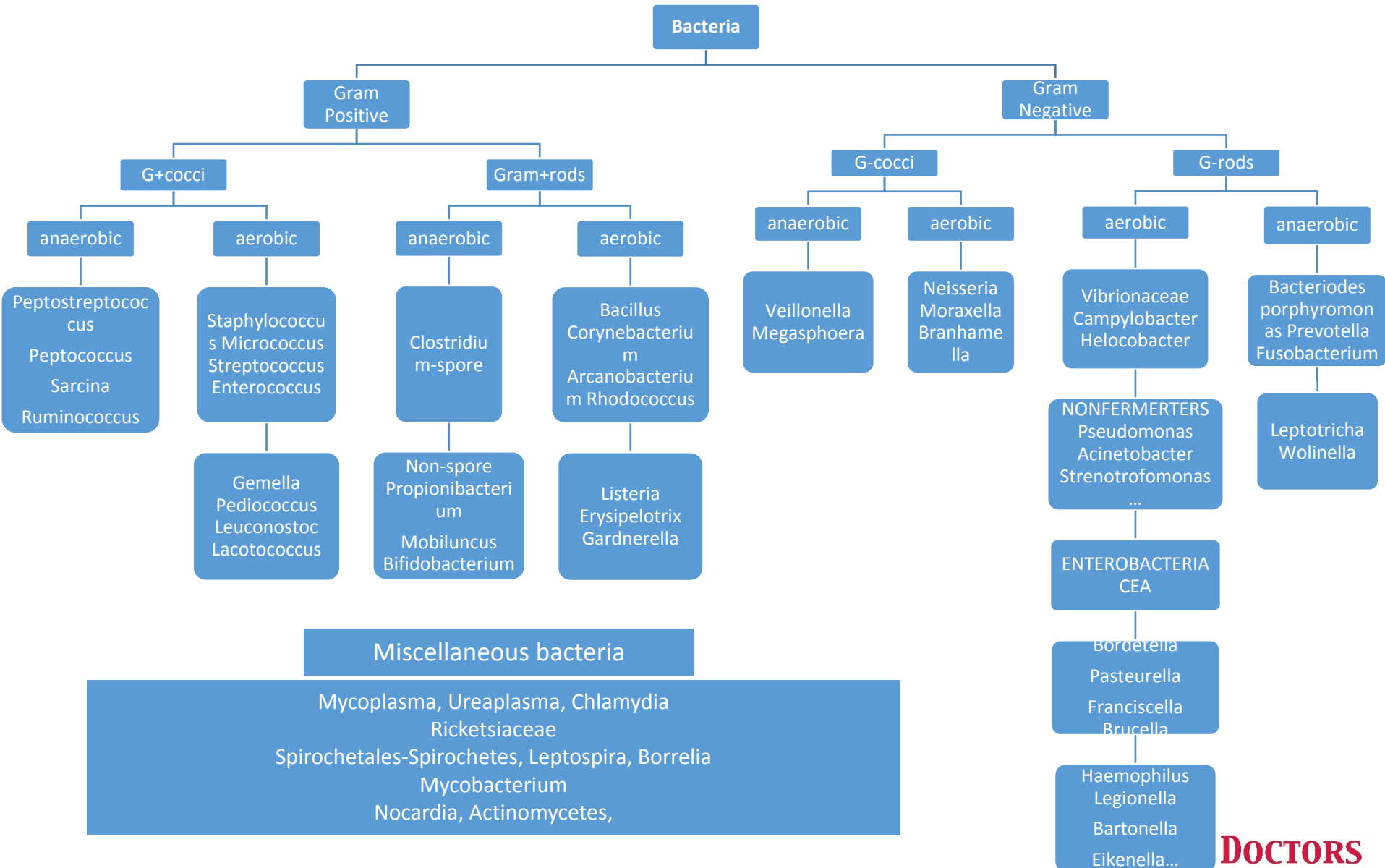


Bacteria Overview

Classification



I. Gram Positive Cocci**Staphylococcus**

Staph. Aureus; MRSA
Staph. Epidermis; Staph saprophyticus

Streptococcus

Strep pneumoniae
Strep pyogenes (Group A)
Strep viridans
Strep Bovis (Group D)

Enterococci

E. faecalis (Group D strep)

II. Gram Positive Bacilli**Spore Forming**

Bacillus anthracis
Bacillus cereus
Clostridium tetani; botulinum; perfringens; difficile

Non-Spore Forming

Corynebacterium diphtheriae
Listeria monocytogenes

III. Gram Negative Cocci**Neisseria**

Neisseria meningitidis
Neisseria gonorrhoeae

IV. Gram Negative Bacilli

Enterics

Escherichia coli
Salmonella typhi; enteridis
Shigella dysenteriae
Klebsiella pneumoniae
Serratia; Proteus
Campylobacter jejuni
Vibrio cholera; Vibrio parahaemolyticus/vulnificus
Helicobacter pylori
Pseudomonas aeruginosa
Bacteroides fragilis

Respiratory bacilli

Haemophilus influenzae
Haemophilus ducreyi
Bordetella pertussis

Zoonotic bacilli

Yersinia enterocolitica; pestis
Brucella; Pasteurella multocida

Other

Gardnerella vaginalis

Other Bacteria

Mycobacteria

Mycobacterium tuberculosis
Mycobacterium leprae

Spirochetes

Borrelia burgdorferi
Leptospira interrogans
Treponema pallidum

Chlamydiaceae

Chlamydia trachomatis
Chlamydophila
Rickettsia
Ehrlichia

Mycoplasmataceae

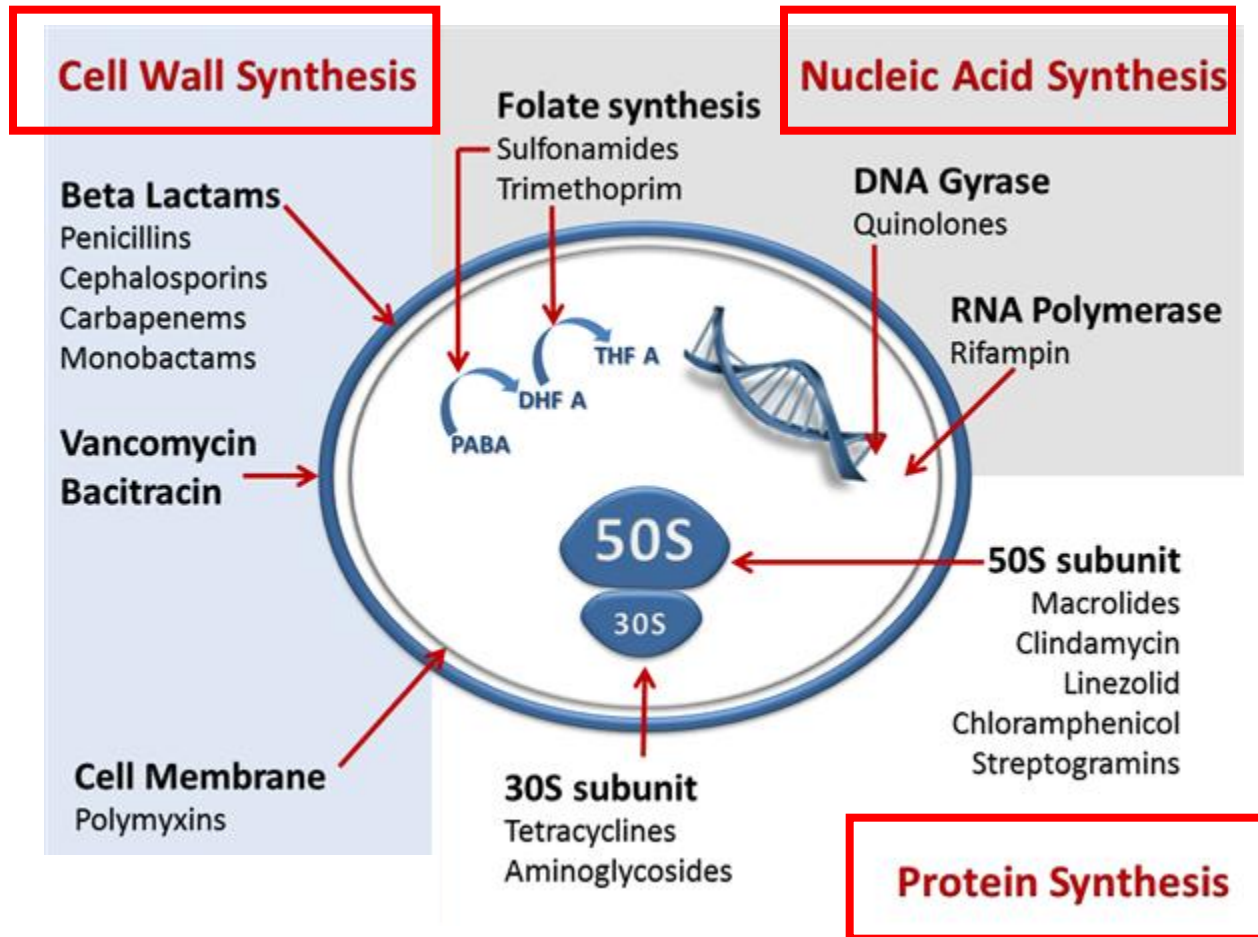
Mycoplasma pneumoniae
Ureaplasma urealyticum

Fungus-like bacteria

Actinomyces israelii
Nocardia

Antibiotic Classification & Mechanism

Overview by Mechanism



Antibiotic Grouping By Mechanism

I. Cell Wall Synthesis Inhibitors

Penicillins
Cephalosporins
Vancomycin
Beta-lactamase Inhibitors
Carbapenems
Bacitracin

II. Protein Synthesis Inhibitors

Aminoglycosides (gentamicin)
Tetracyclines
Macrolides
Chloramphenicol
Clindamycin
Linezolid

III. DNA Synthesis Inhibitors

Fluoroquinolones
Metronidazole

IV. RNA synthesis Inhibitors

Rifampicin

Antibiotic Classification & Indications

I. Cell Wall Synthesis Inhibitors

A. Penicillins

Class/Mechanism	Drugs	Indications
Penicillin	Penicillin G Aqueous penicillin G Procaine penicillin G Benzathine penicillin G Penicillin V	Strep. pyogenes (Group.A) Step. agalactiae (Group B) C. perfringens (Bacilli)
Aminopenicillins	Ampicillin Amoxicillin	Above + Gram-negative organisms: E. faecalis E. Coli
Penicillinase-resistant-penicillins	Methicillin Oxacillin Dicloxacillin	Above + PCNase-producing Staph. aureus
Antipseudomonal penicillins	Carbenicillin Ticarcillin Piperacillin	Above + Pseudomonas aeruginosa

B. Cephalosporins

Class/Mechanism	Drugs	Indications
1st generation	Cefazolin Cephalexin	Staph. aureus Staph. epidermidis Some Gram-negatives: E. Coli Klebsiella
2nd generation	Cefoxitin Cefaclor Cefuroxime	Above + Gram-negative organisms
3rd generation	Ceftriaxone Cefotaxime Ceftazidime	Above + ↑ Gram-negative Pseudomonas

C. Other Cell Wall Inhibitors

Class/Mechanism	Drugs	Indications
Vancomycin	Vancomycin	MRSA PCN S. aureus S. epidermidis
Beta-lactamase Inhibitors	Clavulanic Acid Tazobactam	S aureus S epidermis E.Coli Klebsiella
Carbapenems	Imipenem Meropenem	Broadest activity of any antibiotic (except MRSA, mycoplasma)

II. Protein Synthesis Inhibitors

Anti-30S ribosomal subunit

Class/Mechanism	Drugs	Indications	Toxicity
Aminoglycosides	Gentamicin Neomycin Amikacin Tobramycin Streptomycin	Aerobic Gram-negatives Enterobacteriaceae Pseudomonas	<input type="checkbox"/> Nephrotoxicity <input type="checkbox"/> Ototoxicity
Tetracyclines	Tetracycline Doxycycline Minocycline	Rickettsia Mycoplasma Spirochetes (Lyme's disease)	<input type="checkbox"/> Hepatotoxicity <input type="checkbox"/> Tooth discoloration <input type="checkbox"/> Impaired growth and hence avoid in children < 12 years of age

II. Protein Synthesis Inhibitors

Anti-50S ribosomal subunit

Macrolides

Erythromycin	Streptococcus
Azithromycin	H. influenzae
Clarithromycin	Mycoplasma pneumonia

Chloramphenicol

Chloramphenicol	H influenzae	<input type="checkbox"/> Aplastic Anemia
	Bacterial Meningitis	<input type="checkbox"/> Gray Baby Syndrome

Lincosamide

Clindamycin	Bacteroides fragilis	<input type="checkbox"/> Pseudomembranous colitis
	S aureus	<input type="checkbox"/> Hypersensitivity Reaction
	Coagulase-negative Staph & Strep	

Linezolid

Linezolid	Resistant Gram-positives
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III. DNA Synthesis Inhibitors

A. Fluoroquinolones

Class/Mechanism	Drugs	Indications	Toxicity
1st generation	Nalidixic acid	Streptococcus Mycoplasma Aerobic Gram +	<input type="checkbox"/> Phototoxicity <input type="checkbox"/> Impaired fracture healing
2nd generation	Ciprofloxacin Norfloxacin Ofloxacin Levofloxacin	As Above + Pseudomonas	As above
3rd generation	Gatifloxacin	As above + Gram-positives	As above
4th generation	Moxifloxacin Gemifloxacin	As above + Gram-positives + anaerobes	As above

B. Other DNA Inhibitors

Class/Mechanism	Drugs	Indications	Toxicity
Metronidazole	Metronidazole	Anaerobics	<input type="checkbox"/> Seizures <input type="checkbox"/> Cerebellar dysfunction <input type="checkbox"/> ETOH disulfiram reaction

IV. RNA Synthesis Inhibitors

Rifampin	Rifampin	Staphylococcus Mycobacterium (TB)	<input type="checkbox"/> Body fluid discoloration <input type="checkbox"/> Hepatotoxicity (with INH)
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V. Mycolic Acids Synthesis Inhibitors

Isoniazid	Isoniazid	TB Latent TB
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VI. Folic acid Synthesis Inhibitors

Trimethoprim/Sulfonamides	Trimethoprim/ Sulfamethoxazole Sulfadiazine	UTI organisms Proteus Enterobacter	<input type="checkbox"/> Thrombocytopenia <input type="checkbox"/> Avoid in third trimester of pregnancy
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Pyrimethamine	Pyrimethamine	Malaria T. gondii
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Clinical Application

USA National Research Council System

Wound classification	Criteria	Examples
Clean	<p>An incised wound through uninflamed tissue created at elective surgery and closed primarily. Only a closed system of drainage employed</p> <p>Oropharyngeal, tracheobronchial, gastrointestinal, biliopancreatic, genitourinary tracts are not entered</p> <p>No breach in aseptic technique</p>	<p><i>Non-implant</i></p> <p>Mastectomy</p> <p><i>Herniorrhaphy</i></p> <p><i>Implant</i></p> <p>Hip replacement</p> <p>Hernioplasty</p>
Clean-contaminated	<p>Wound (that is otherwise clean) created at emergency surgery</p> <p>Reoperation via clean incision within 7 days</p> <p>Elective controlled entry into visceral tracts with minimum spillage of contents</p> <p>Minor break in aseptic technique</p>	<p>Cholecystectomy</p> <p>Elective lung resection</p>
Contaminated	<p>Wounds left open; fresh accidental wounds; penetrating trauma < 4 hours old</p> <p>Operations with gross spillage of gastrointestinal contents; major breaks in sterile technique</p>	<p>Stab wound</p> <p>Non-perforated appendicitis</p>
Dirty	<p>Presence of pus</p> <p>Preoperative perforation of oropharyngeal, tracheobronchial, gastrointestinal, biliopancreatic, genitourinary tracts</p> <p>Penetrating trauma > 4 hours old</p>	<p>Laparotomy wound for sigmoid diverticular perforation</p>

Prophylactic Antibiotics

1. When the risk of infection is high (>4%)
 - Clean “no antibiotics”
 - Clean-contaminated “single dose”
 - Contaminated “3 doses”
 - Dirty “Prolonged”
2. High Risk Patient factors
 - Immunocompromised
 - Unstable DM
 - Malnutrition
 - Morbid obesity
3. Implants/Open cavities
 - Orthopaedic or Vascular Implants
 - Bony cavities e.g., craniotomy/sternotomy
 - Prosthetic heart valves

Antibiotic prophylaxis

- Hospital protocol: depends upon spectrum of organisms likely to be encountered; cost; local resistance trends
- Maximum blood levels should be obtained at the critical time – single dose IV at induction
- Repeat: prosthetic use, prolonged operation, excessive blood loss, unexpected contamination
- Benzyl penicillin for C.Welchi/C.perfringens

Antibiotic prophylaxis

- Amputations: Benzylpenicillin – after anaesthetic induction, 6-hourly for 48 hours
- Vascular surgery: 3 doses of flucloxacillin +/- gentamicin; infected graft – consider vancomycin
- Orthopaedic procedures: Co-Amoxiclav, Cefuroxime, Metronidazole, Gentamycin
- Cefuroxime in urological instrumentation
- Cefuroxime + metronidazole in open abdominal surgery
- Oesophagogastric procedures: 3 doses 2nd generation cephalosporin + metronidazole
- Biliary procedures: one dose of 2nd generation cephalosporin

Antibiotic prophylaxis

- Small intestine: 3 doses of 2nd generation cephalosporin + metronidazole
- Large bowel (including appendix): 3 doses of 2nd generation cephalosporin + metronidazole

Splenectomy prophylaxis

- Splenectomy patients or patients with functional hyposplenism require the following vaccines and/or antibiotics
- Pneumococcal immunization
 - Haemophilus influenza type B vaccine
 - Meningococcal group C conjugate vaccine
 - Influenza immunization
 - Prophylactic antibiotics (oral phenoxymethylpenicillin or erythromycin)

Thank You!