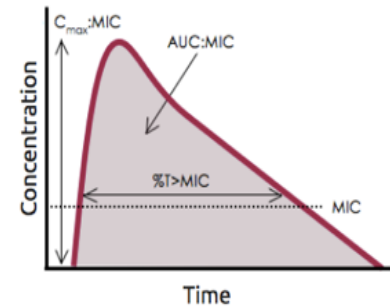




β-lactam Study Cheat Sheet

β-LACTAM CLASSES	
β-lactam Class	Coverage Generalization
Penicillins	
Penicillins: aqueous PCN G, PCN V potassium, PCN benzathine, procaine PCN	Streptococci, basic anaerobes (e.g., non-difficile <i>Clostridium</i> spp), syphilis (<i>Treponema pallidum</i>)
Aminopenicillins: ampicillin, amoxicillin	Enterococci (DOC), Streptococci, basic anaerobes, <i>Listeria monocytogenes</i> (DOC), not MSSA
Anti-Staphylococcal Penicillins aka Penicillinase-resistant penicillins	“CONDOM” – cloxacillin, oxacillin, nafcillin, dicloxacillin, oxacillin (again), methicillin [placed here to help w/ formatting] → MSSA
Penicillin/BLI combinations: ampicillin-sulbactam, amoxicillin-clavulanic acid, piperacillin-tazobactam	Streptococci, Enterococci, MSSA, Gram negatives (more with pip/taz, which also has <i>Pseudomonas</i> activity), anaerobes (including <i>Bacteroides fragilis</i>)
Cephalosporins (As a class, have limited coverage versus anaerobes & Enterococci)	
1st gen: cephalexin, cefadroxil, cefazolin (IV)	Streptococci, MSSA, “PEcK” – <i>Proteus</i> , <i>E. coli</i> , <i>Klebsiella</i>
2nd gen: cefoxitin (IV), cefotetan (IV), cefaclor, cefprozil, cefuroxime (IV)	Streptococci, MSSA, “HEN PEcK” (<i>Haemophilus influenzae</i> , <i>Neisseria</i> , <i>Proteus</i> , <i>E. coli</i> , <i>Klebsiella</i>), cefoxitin and cefotetan are cephamycins and have anaerobic activity
3rd gen: ceftriaxone (IV), ceftazidime (IV), cefdinir, cefixime, cefotaxime, cefpodoxime, ceftibuten	Streptococci (better than 1st or 2nd gen), MSSA (not as good as 1st or 2nd gen), broad gram negative coverage (ceftazidime even has <i>Pseudomonas</i> activity)
4th gen: cefepime (IV)	Streptococci (better than 1st or 2nd gen), MSSA, broad Gram negative coverage (better than 3rd gen) and has <i>Pseudomonas</i> activity
“5th” gen: ceftaroline (IV)	Like ceftriaxone + MRSA coverage
Cephalosporin/BLI combinations: Ceftazidime/avibactam (IV), ceftolozane-tazobactam (IV)	MSSA, Streptococci, broad Gram negative coverage including <i>Pseudomonas</i> and some carbapenem-resistant bacteria
Carbapenems (All are IV only, all have broad Gram negative activity, and none cover MRSA)	
Carbapenems: ertapenem, meropenem, imipenem-cilastatin, doripenem	MSSA, streptococci, anaerobes (including <i>B. fragilis</i>), ertapenem lacks coverage for “APE” – <i>Acinetobacter</i> , <i>Pseudomonas</i> , <i>Enterococcus</i> ; Considered DOC for ESBL+
Carbapenem/BLI combinations: meropenem-vaborbactam	Above + some carbapenem-resistant Gram negative organisms
Monobactam (not really a beta-lactam)	
Monobactam: aztreonam	Gram negative coverage only, including <i>Pseudomonas</i>

The PK-PD indices associated with antibacterial activity



β-lactams exhibit time-dependant killing
→ The longer the time above the MIC during the dosing interval, the more killing

No renal dose adjustments

- Oxacillin
- Nafcillin
- Ceftriaxone

	Penicillin	Amoxicillin	Ampicillin	Cephalexin	Cefuroxime	Cefoxitin	Ceftriaxone	Cefotaxime	Cefepime	Ceftazidime
Similar side chains										
Penicillin	■						X			
Amoxicillin		■	X	X						
Ampicillin		X	■	X						
Cephalexin		X	X	■						
Cefuroxime					■	X	X	X		
Cefoxitin	X					■				
Ceftriaxone					X		■	X	X	X
Cefotaxime					X		X	■		X
Cefepime							X		■	
Ceftazidime							X	X		■

Ceftriaxone dosing in adults

- 1gm daily (most infections)
- 2gm daily (some infections)
- 2gm BID (endocarditis & meningitis)

Common continuous infusion β-lactams

- Penicillin
- Oxacillin
- Cefazolin
- Piperacillin/tazobactam

- Carbapenems are like “cannons” because of their coverage of drug-resistant Gram negatives
- Piperacillin-tazobactam has activity versus anaerobes and Enterococci, while cefepime does not
- Cephalosporins have almost no role in treating Enterococci, except for treating Enterococcal endocarditis

Abbreviations: AUC = area under the curve, BLI = β-lactamase inhibitor, Cmax = maximum concentration, DOC = drug of choice, ESBL = extended spectrum β-lactamase, IV = intravenous, MDR = multi drug-resistant, MIC = minimum inhibitory concentration, MSSA = methicillin-sensitive *Staphylococcus aureus*, MRSA = methicillin-resistant *Staphylococcus aureus*, PCN = penicillin