





Northwestern Medicine β -Lactam Cross-reactivity Side-Chain Chart

		PEN					1 st GEN			2 nd GEN				3 rd GEN							4 th	5 th GEN		CARB		MONO	
		Penicillin G/V	Oxacillin	Amoxicillin	Ampicillin	Piperacillin	Cefadroxil	Cephalexin	Cefazolin	Cefaclor	Cefoxitin	Cefprozil	Cefuroxime	Cefdinir	Cefditoren	Cefixime	Cefotaxime	Cefpodoxime	Ceftazidime	Ceftibuten	Ceftriaxone	Cefepime	Ceftaroline	Ceftolozane	Ertapenem	Meropenem	Aztreonam
PEN	Penicillin G/V	Clear	Clear	Clear	Clear	Yellow	Yellow	Clear	Yellow	Clear	Yellow	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
	Oxacillin	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
	Amoxicillin	Clear	Clear	Clear	Clear	Red X	Yellow	Clear	Yellow	Clear	Red X	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
	Ampicillin	Clear	Clear	Clear	Clear	Yellow	Red X	Clear	Red X	Clear	Yellow	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
	Piperacillin	Clear	Clear	Clear	Clear	Yellow	Yellow	Clear	Yellow	Clear	Yellow	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
1 st GEN	Cefadroxil	Yellow	Red X	Yellow	Yellow	Clear	Yellow	Yellow	Yellow	Red X	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
	Cephalexin	Yellow	Yellow	Red X	Yellow	Yellow	Clear	Red X	Clear	Yellow	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	
	Cefazolin	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	
2 nd GEN	Cefaclor	Yellow	Yellow	Red X	Yellow	Yellow	Red X	Clear	Yellow	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	
	Cefoxitin	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Red X	Clear	Clear	Clear	Yellow	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	
	Cefprozil	Yellow	Red X	Yellow	Yellow	Red X	Yellow	Yellow	Yellow	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	
	Cefuroxime	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Red X	Clear	Clear	Clear	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
3 rd GEN	Cefdinir	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Yellow	Red X	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
	Cefditoren	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Yellow	Yellow	Red X	Red X	Yellow	Yellow	Yellow	Yellow	Yellow	Red X	Red X	Yellow	Yellow	Yellow	Yellow	
	Cefixime	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Red X	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
	Cefotaxime	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Yellow	Clear	Clear	Yellow	Yellow	Red X	Yellow	Red X	Yellow	Yellow	Yellow	Yellow	Red X	Red X	Yellow	Yellow	Yellow	Yellow	
	Cefpodoxime	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Yellow	Yellow	Red X	Yellow	Red X	Yellow	Yellow	Yellow	Yellow	Red X	Red X	Yellow	Yellow	Yellow	Yellow	
	Ceftazidime	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
	Ceftibuten	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
	Ceftriaxone	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Yellow	Yellow	Red X	Yellow	Red X	Red X	Yellow	Yellow	Yellow	Red X	Yellow	Yellow	Yellow	Yellow	Yellow	
4 th	Cefepime	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Yellow	Yellow	Red X	Yellow	Red X	Red X	Yellow	Yellow	Yellow	Red X	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
5 th GEN	Ceftaroline	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
	Ceftolozane	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
CARB	Ertapenem	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	
	Meropenem	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	
MONO	Aztreonam	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Red X	Clear	Clear	Clear	Yellow	Yellow	Yellow	Yellow	Yellow	

- Select a β -lactam from a different class with a dissimilar R1/R2 side chain (clear box)
- The R1 side chain is the major factor for cross-reactivity due to antibody recognition between cephalosporins and penicillins.
- Cross-reactivity with cefazolin or carbapenems is very unlikely
- Cross-reactivity with monobactam (aztreonam) is absent, with the exception of ceftazidime
- Independent hypersensitivity reactions (HSR) not related to a cross-reaction due to antibody recognition may occur (e.g. oxacillin: often non-IgE-mediated HSR - maculopapular rash, acute interstitial nephritis, and immune-mediated hepatitis)

 = AVOID Cross-reaction likely Identical R1 or R2 side chain	 = CAUTION Cross-reaction less likely Similar R1 or R2 side chain	 = SUGGEST Cross-reaction least likely Dissimilar R1 or R2 side chain
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