Christchurch Medicines Information Service
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Therapeutic Drug Monitoring of Aminoglycosides

Aminoglycosides (gentamicin, tobramycin and amikacin) are bactericidal antibiotics used to treat infections caused by Gram-negative organisms. Therapeutic drug monitoring is recommended to ensure adequate dosing and prevent adverse effects such as nephrotoxicity and ototoxicity. Aminoglycosides demonstrate concentration-dependent bactericidal activity, which is optimal when the maximum concentration (C_{max}) is ≥ 10 times the minimum inhibitory concentration (MIC) of the organism. A MIC of 1 mg/L can be assumed for most organisms; however, higher MICs (e.g. ≥ 2 mg/L) are common with *Pseudomonas aeruginosa*. These peak concentrations correspond to an area under the concentration-time curve (AUC_{24}) of 70-100 mg/L.h for gentamicin and tobramycin. Prolonged high AUC_{24} and minimum concentrations (C_{min}) are more likely to cause toxicity.

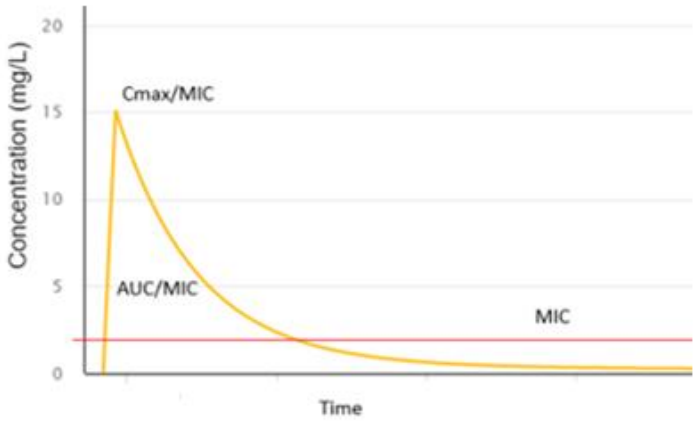
Pharmacokinetic/Pharmacodynamic Targets*

Gentamicin or tobramycin

- AUC_{24}: 70-100 mg/L.h
- C_{max}: 15-30 mg/L
- C_{min}: < 1 mg/L

Amikacin

- AUC_{24}: 160-200 mg/L.h
- C_{max}: 30-60 mg/L
- C_{min}: < 2 mg/L



*For adult patients receiving once daily dosing, and excluding those with endocarditis

- *Aim for a C_{max} at the higher end of the range for infections caused by Pseudomonas aeruginosa, given that its MIC is likely > 1 mg/L.*
- *Aminoglycosides concentrate in the urine at higher concentrations than in the plasma, so an AUC_{24} at the lower end of the range (e.g. 70 mg/L.h) is usually sufficient for a urinary tract infection.*
- *Aim for a higher AUC_{24} (e.g. 80-100 mg/L.h) for more serious infections.*
- *Giving a higher dose and extending the dose interval (e.g. to 48 hours) is sometimes needed to attain both the optimal C_{max} and C_{min} targets.*

For a comprehensive guide on therapeutic drug monitoring for both aminoglycosides and vancomycin see:
http://www.medicinesinformation.co.nz/wp-content/uploads/2022/05/Aminoglycosidevancomycin-TDM-workbook-6th-edition-2022.pdf