Antibiotics

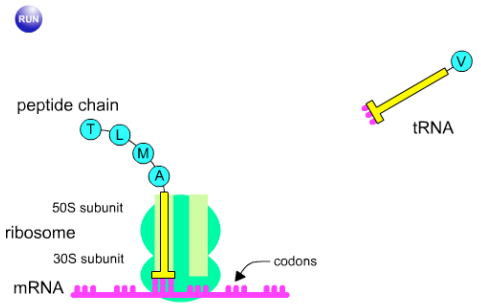
Aminoglycosides

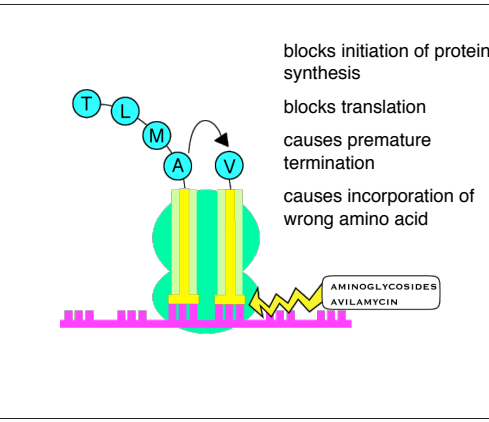
drugs

- **old drugs**
  - streptomycin / dihydrostreptomycin
  - neomycin (Framycetin)
- **newer drugs**
  - gentamicin
  - amikacin
  - tobramycin
  - netilmicin
- **aminocyclitols**
  - apramycin
  - spectinomycin

mechanism

- **block peptide synthesis**
- **rapidly bacteriocidal**
- **effect concentration dependent**
- **post antibiotic effect**





mechanism

- **must get into cell to act**
  - oxygen dependent polyamine carrier
  - not present in anaerobes
  - blocked by low pH, Ca^{++}, Mg^{++}, hyperosmolar conditions

resistance

- **develops quickly**
  - especially Staphs
- **cross resistance not complete**
  - amikacin not easily broken down

resistance

- **inactivation**
  - at least 9 enzymes
  - plasmid transmitted
- **failure to get into cells**
  - cell wall damaging drugs
  - chloramphenicol
- **alterations in binding site**
  - chromosomal mutation

spectrum of activity

- **aerobic Gram negatives**
  - Pseudomonas
- **(Staphs)**
- **(Mycobacteria)**
- **not Streps**

side effects

- **ears**
  - deafness
  - loss of balance
- **kidneys**
  - failure
- **(neuromuscular blockade)**

ears

- **deafness**
  - dihydrostreptomycin
  - neomycin
  - amikacin
  - people & cats most sensitive
- **loss of balance**
  - streptomycin
  - gentamicin

kidneys

- **all aminoglycosides**
- **potentiated by**
  - dehydration
  - frusemide
  - low blood pressure
  - NSAIDs?

pharmacokinetics absorption

- **highly polar**
  - not absorbed from gut
  - do not penetrate CNS / eye / secretions
  - useful concentrations in synovial fluid

administration

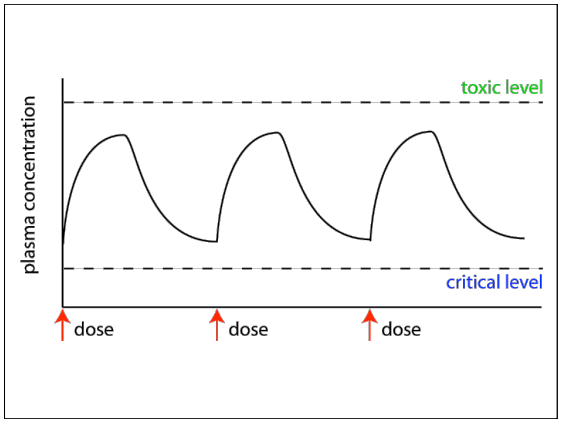
- **usually given parenterally**
  - im or sc 90% bioavailable
  - im injections painful
- **other preparations**
  - intramammary
  - oral

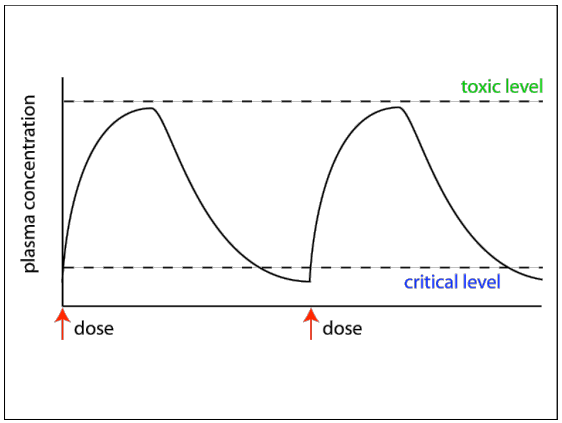
distribution

- **to extracellular fluid**
  - not into cells
- **rapid**
- **not protein bound**

elimination

- **parenteral**
  - glomerular filtration
- **oral**
  - faeces
- **short half lives - 2 - 3 hours**
- **inactivated by pus**





administration

- **give a big dose once daily rather than small doses often**
- **reduce the dose in kidney failure**
- **monitor creatinine**

residues

- **hangs around in kidneys for years**
- **long witholding times**

use

- **used to be main treatment for G- aerobes**
- **fluoroquinolones now 1st choice**
  - less toxic in most species
  - horses?

indications

- **streptomycin**
  - leptospirosis
  - (TB in people)
- **gentamicin etc**
  - serious G- infections
  - *Pseudomonas* infections
  - mainly horses

combinations

- **penicillin & gentamicin**
  - broad spectrum
  - sometimes used for difficult G+
- **penicillin, gentamicin & metronidazole**
  - covers most bacteria
  - peritonitis etc

abuse

- **mastitis**
  - no evidence of efficacy in NZ
- **neonatal diarrhoea**
  - use fluids instead
- **horticulture**
  - fireblight
  - use declining

precautions

- **fluid balance**
  - ensure animal is not dehydrated
  - watch blood pressure
  - avoid nephrotoxic drugs
- **working dogs**

interactions

- **penicillins**
  - synergy?
  - chemically incompatible
- **some cephalosporins**
- **frusemide**
  - nephrotoxicity

3 yr old thoroughbred

- **injured knee 3 days ago**
- **knee now swollen, hot & painful**
- **TPR normal**

diagnosis

- **septic arthritis**
  - bacteria unknown

treatment

- **flush joint**
- **intra-articular penicillin & gentamicin**
- **systemic penicillin & gentamicin**

aminoglycosides

- **G- aerobes**
- **toxic to kidneys and ears**
- **give a big dose once daily rather than small doses often**
- **may be synergistic with penicillins under some conditions**